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Better Crops with PLANT FOOD

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R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*
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TABLE OF CONTENTS, OCTOBER, 1927

Neighbors 3
"Love thy neighbor as thyself," by Jeff.

Cause and Control of Corn Root Rot 5
An insidious disease, by C. T. Gregory.

The Comeback of the Cut-over 9
Cropping the Coastal Plain, by Sid Noble.

Why Credit Stays High 13
The cause of high interest, by A. P. Chew.

Pork Stands the Test 15
A ham sandwich is a good food balance.

Indiana 16
Purdue is visited, by T. R. Johnson.

Storing Apples 20
How apples are kept in a cave, by C. E. Baker.

Rice 22
How Arkansas grows it, by R. B. Fairbanks.

Mint 25
Its production discussed by G. A. Peterson.

Merrimack Potatoes 28
A New Hampshire spud county, by E. W. Holden.

Where Insects Winter 30
Forestalling the pests, by Don B. Whelan.

Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY.
of Amsterdam, Holland
Directors: J. N. HARPER G. J. CALLISTER

EWING GALLOWAY

"Watermelon? Yassuh Boss, you sho' said a mouth full."

Better Crops with Plant Food

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Jeff says that we should all be good

Neighbors

By Jeff McDermid

I HAVE lived with neighbors who were only five inches of lath and plaster distant from me; and I have had to ride a cayuse for an hour in order to reach my nearest neighbor. Some of my neighbors have been too mean to lend me a spoonful of stock salt, while others have been as flush with the milk of kindness as Segis Pietertje Prospect.

What are neighbors, and why? How far off must a person be to cease being neighborly? What are the limits of range in being a neighbor or in having one, and how do we measure it?

Last night I listened to the phonographic voice of a chap who used to be counted as my neighbor, but who has since passed beyond the portals. An hour later I heard a church choir composed of former old neighbors singing hymns in a city eight hundred miles away. Then I asked the man who shares my apartment house to endorse my note and he couldn't hear me.

That's the way it goes. It must have something to do with Einstein's "relativity" or some other equally abstruse proposition. Yet I shall not fail in my effort to get this thing out of my system, for we all have neighbors whether we want them or not.

Noah Webster is one of my unfailing indices. I can always get a

fresh viewpoint by consulting his definitions and illustrations. Words that may perhaps seem commonplace have a bigger meaning after I have laid down my pipe to dip into his hefty book. Although the old woman found his stories "mighty disconnected," she doubtless profited by her faithful perusal of his compendium.

He says that neighbor is derived from the Anglo Saxon word "neahgebur." Translated, it means nighdweller. Then he amplifies a bit by explaining that it also signifies one who is near to another by confidence or sympathy.

THIS brings me to the nub of a certain text I learned from the book of Luke one somnolent Sunday long ago. Mrs. Main, the patient lady teacher of the old Tenth Ward gang, pounded it into my head somehow, where it has stuck by some freak of memory that is no special credit to me.

Luke, the physician, was perhaps pretty well fed up on alleged neighborly feeling, and maybe some of his neighbors owed him a fee, so he was qualified to grab the world by the ears in this text.

Here it has stood for centuries in the story of the Good Samaritan, thrusting at us always the challenge of whether distance or acquaintance really determines neighborly feeling and neighborly responses after all.

After telling about the first two travelers who passed by the unfortunate man on the Jericho highway, he shows how the Samaritan rescued him from under the overturned tonneau of his Damascus twin six and rushed him to the waiting hostelry.

"Which now of these three, thinkest thou, was neighbor of him who fell among thieves?"

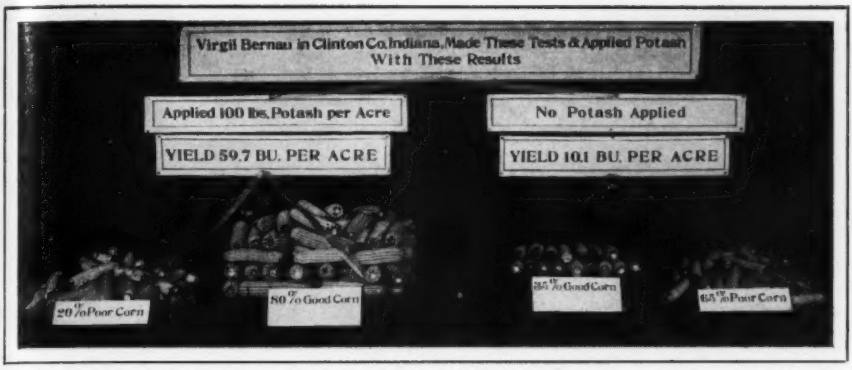
The Tenth Ward gang always had the right answer. It was very obvious and we couldn't see any puzzle to it, like the other one about the much-married gentleman coming from St. Ives. Of course, the Good Samaritan was the hero of the parable. But he was cast in this role for readers of a simpler age of social control. We Tenth Warders lived before the community chest and the budget system of relief came into vogue. That is, we pitched in and helped our neighbors wash their dirty linen sometimes because we didn't quite know when blue Monday might come to us.

Stop and ask yourself if the course followed by the Good Samaritan in Dr. Luke's story would carry the same consequences today? Maybe the Good Samaritan would be jollied a lot for doing such a stunt when the Associated Charities could be summoned from the nearest farm house by telephone. Furthermore, would the modern innkeeper accept such a disheveled pair of tourists without calling up the police department, the Chamber of Commerce, or the Y. M. C. A. for advice? Would not the extremists in the radical press berate him as an influential citizen who had done nothing to make the Jericho highway wider and safer for the motorist?

It simply suggests that we dispense our neighborly feeling in the mass, by proxy and by virtue of red tape instead of in the old personal way. Mr. Kindheart is apt to be dubbed Mr. Buttinsky by a populace that has not lost its love for humanity in general, but fails too often to show its love for humanity in particular.

NOW the one who really loses is not the poor gaffer out-at-elbows, or the poor orphan, or the bedridden widow. They get the royal relief all right, but the dole comes as a professional flourish at the hands of those to whom the job of bringing good cheer carries no thrill or heartwarming opportunity. When I give my dollar to the subscription campaign I lose the human touch, although I have been "touched" in quite a different, perfunctory way.

(*Turn to Page 62*)


Virgil Bernau in Clinton Co. Indiana, Made These Tests & Applied Potash With These Results
Applied 100 lbs. Potash per Acre
YIELD 59.7 BU. PER ACRE
No Potash Applied
YIELD 10.1 BU. PER ACRE
20% Poor Corn
80% Good Corn
35% Good Corn
65% Poor Corn

A farm test showing the value of potash fertilization in overcoming corn root rot.

Cause *and* Control *of* Corn Root Rot

By C. T. Gregory

Purdue Agricultural Experiment Station

ROOT rot of corn is one of the most insidious diseases known. It may kill the corn plant early in its life. It may let the plant drag along through the season but cut short its career long before the ear has filled and matured. On the other hand diseased plants may live till frost kills them in the fall but still the ears are far from mature. It is odd that the same disease should kill some plants quickly and apparently prolong the lives of others.

In the early studies of this disease, it was thought that the trouble was due solely to the attacks of fungi on the roots. The roots were rotted and stalks were rotted and the same fungi could be found in both places. However, it is apparent now that other factors are the cause of the trouble, and root rot is the final result. The cause of many cases of root rot lies within the joint tissues of the corn plant, in the sap tubes. Two substances, iron and aluminum, accumulate in the sap tubes, plugging them up and preventing the passage of foods in the plant. What is the result? Naturally when the food supply to the roots is reduced, starvation and weakening occur. The weak roots cannot throw off the attacks of the rotting fungi or bacteria. Certainly, the rotting is caused by these organisms, but it is the plugging of the sap tubes that starts the trouble. Another complicating factor is found in the genetics of the corn plant; some plants are more resistant to the trouble than others.

When we know these facts concerning the true nature of root rot, the peculiar actions of the disease can be explained. The premature death of the plants is merely an

Condition of the stalks in the field above indicate potash deficiency. Iron accumulations in the joint cause the dark discolorations of the tissues as shown in the lower photograph.

aggravated case of iron accumulation in the sap, so severe that the entire plant literally starves to death. Of course the roots are also rotted. The plants that die in midsummer, those plants that many farmers think are early maturing strains, are usually filled with iron or aluminum. The plants that linger along till frost cuts short their career are merely less aggravated cases of sap tube plugging. The plant cannot furnish sufficient food to mature the ear as it should and as a result the ear is sappy and immature. In the same way we can explain the unfilled nubbins and the chaffy ears.

Since this root rot disease is the result of these accumulations, the control must be some measures to prevent iron and aluminum from plugging the sap tubes. The solution of the problem lies in fertilizers. It is known that sufficient potash in the soil will prevent iron accumulations and phosphate will take care of the aluminum. This does not mean that potash keeps the iron out of the plant, because if it were so, it would be disastrous. Every green plant needs iron; it is an important constituent of the chlorophyl. Potash seems to act more like a traffic cop, forcing the iron to move along where it is needed instead of stopping in the sap tubes of the joints.

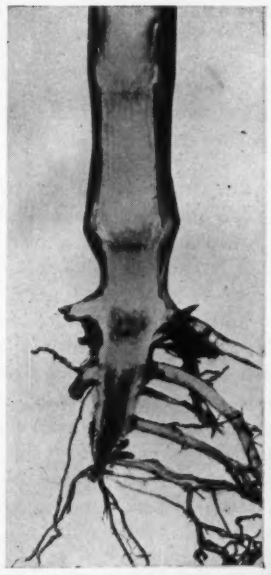
This is a good theory, but how can the farmer tell whether potash or phosphate is needed? Here again the answer is ready; we let the corn plant diagnose its own needs.

The evidences of potash hunger are the firing of the edges of the leaves, the nubbin ears, and the rotting of the internal tissues of the stalk with consequent bending or breaking of the stalk. In some cases the leaves will develop yellow streaks, and in extreme cases the plants will be greatly stunted. This occurs most commonly on soils that are neutral or alkaline in their reaction.

The most certain evidence of potash deficiency is obtained by the new stalk test developed by Dr. G. N. Hoffer at Purdue working in cooperation with the Cereal Office of the U. S. Department of Agriculture. This test is for iron accumulations in the stalk, since heavy deposits of this substance in the joints are a certain indication that potash is deficient.

Phosphate deficiency is revealed in several ways. Stunted plants on an acid soil are almost certain evidence that phosphate is lacking. Too much emphasis cannot be placed on the need of the soil test in connection with the stunted plants, because, as has been indicated above, stunted plants on sweet soils may be due to potash deficiency. Phosphate deficiency will act in any kind of soil, but it is more liable to occur in sour soils. Another indication is the darkening or rotting of the joint tissues in which the iron test is negative. The darkening of the tissues is due to aluminum accumulations. Another indication that is rather tricky and cannot be relied upon too fully is the purpling of the leaves, particularly along the margins. It must be remembered that smut infested stalks, particularly when the ears are destroyed, will become purple. Certain strains of corn are also apt to produce this red color. This purpling of the leaves in young plants due to phosphate deficiency is more pronounced when excessive amounts of nitrate are present. In general we may say that phosphate deficiency is indicated by stunted plants on acid soils.

Nitrate deficiency is indicated by a yellowish color in the leaves. Dr. Hoffer has a test solution which produces a blue color in the



Left: Stunted plants with affected joints in the stalks indicate aluminum accumulations.

Below: This field shows symptoms of phosphate starvation when the soil is acid. If the soil is alkaline the trouble may be due to potash starvation.

EFFECT OF POTASH ON CORN YIELDS, CASS COUNTY

		No fertilizer		Fertilizer			
Name of farmer	Soil	Iron test	Nitrate test	Iron test	Nitrate test	Fertilizer applied	Increased yield
Ed. Lybrook	Clay	++	—	Normal	+	Potash	5.2 bu.
Claude Pavey	Black sand	+++	++	Normal	++	Potash	20.0 bu.
J. L. Ledgard	Clay	+++	+	+	+	Ac. Phos. Potash	7.7 bu.
Elmer Elliott	Light clay	+++	—	+	—	Ac. Phos. Potash	9.0 bu.
R. V. Lybrook	Heavy clay	++	+	Normal	++	Potash	6.6 bu.
Frank Tyner	Muck	++++	++	+	++	Potash	9.0 bu.
Geo. Banta	Muck	+++	++	+	++	Potash	9.0 bu.
E. J. Zeck	Black loam	—	++	—	++	Potash	.7 bu.
Carl Miller	Dark loam	+	++	—	++	Potash	1.9 bu.

sap when applied to the cut surface of the stalk if there are excess nitrates in the tissues. A negative test accompanying yellow leaves is a good indication of nitrate deficiency.

So much for the theory and the nature of the tests, but the question is does it work? Will potash and phosphate fertilizers overcome root rot when applied under farm conditions?

In Clinton county, Indiana, Virgil Bernau used 100 pounds of potash on his potash deficient black sand. Where he used the fertilizer he raised 59.7 bushels of good quality corn per acre. Where no fertilizer was used he obtained 10.1 bushels per acre of poor quality corn.

In LaPorte county, Ray Gourley used 125 pounds of 0-14-14 on his black loam soil. On the fertilized plot there were no down stalks and the corn matured in good shape, while in the unfertilized part many of the stalks were down and corn was much more chaffy.

In Jackson county, George Miller applied 100 pounds of potash per acre. His yields were 33 bushels of immature, chaffy corn on the unfertilized plot and 43.8 bushels of high quality corn where the potash was applied.

In Newton county, W. F. Mashino used several combinations of fertilizer. With 100 pounds of potash his yield was 67.3 bushels per acre, with potash plus 0-10-10 the yield was 75.8 bushels, with 0-10-10 alone be obtained 56.8 bushels, and without phosphate or potash his yield was 15 bushels per acre. This was a case where both potash and phosphate were needed to overcome the root rot. Tests were made on his corn stalks and showed that the iron accumulations in the joints were most pronounced where no fertilizer was applied.

In the same county Ray Souder had about the same results. Potash plus 0-10-10 produced 69 bushels, 0-10-10 alone gave 53 bushels and no fertilizer gave 20 bushels per acre—another proof that this soil needs potash and phosphate.

Perhaps the most striking case occurred in Cass county. The results are given in the accompanying table.

It will be noted that good results were obtained in every case except the last two which would seem to show that potash is not always beneficial. However, examine the stalk test records in these two cases. The iron test on the unfertilized parts indicated that no potash was needed on this soil. The yields verified the test.

(*Turn to Page* 54)

Farmers examining cotton grown with and without fertilizer.

THE COMEBACK *of the* CUT-OVER

By Sid Noble

IT was in the smoking compartment of a New Orleans bound Pullman one hot summer day several years ago that I first heard the coastal plain region, that belts Mississippi just above the Gulf of Mexico, called "The New California." Branding this as a typical smoking-car conjecture I thought vaguely of bathing beauties, golf links, sunkist oranges, and whatnot.

The country was withal a rather drab train-window adventure in geography, mile upon mile of woods grass blowing in the wind, sprinkled as far as eye could see with stumps and charred ruins of what was once a great yellow pine forest. Here was the graveyard of innumerable pines, I thought.

At nearly every town the buzzing whine of the inevitable sawmill cut through the noise of the train like a dirge, signifying the continual spread of the graveyard. How could such a land be termed "The New California"?. Even then it must be reaching the end of its supply of virgin timber and coming closer and closer to the "dark brown taste" of the morning after.

As I listened to my chance acquaintance describe the section in glowing terms, I little realized that some years later I was to be given the opportunity to see logic in his reasoning. In fact, I promptly forgot the entire incident and never thought of it again until it was recalled to me a few days ago by another trip through South Mississippi.

This time I went to visit the Agri-

Director Ferris is shown standing in a plat fertilized with 240 lbs. of acid phosphate, 90 lbs. of ammonium sulphate and no potash per acre. The yield per acre was 648 lbs. of seed cotton, an increase of 126 lbs. over the check.

cultural Experiment Station at Poplarville, to talk with Director E. B. Ferris about its accomplishments. Poplarville, the county seat of Pearl River county, is in the heart of the region that years before had been so zealously described to me as "The New California."

Cut-over Land Abundant

Mississippi has some 10,000,000 acres in this region and although most of this was originally timber land, as far back as 25 years ago when the Experiment Station was established under the direction of Mr. Ferris, the pine forests were fast disappearing and cut-over land was abundant. More and more people were getting out of the business of saw-milling and turning to farming. It was well that the Station gained a foothold at that time for today the yellow pine is practically all gone and the people are almost wholly dependent upon the soil.

The mission of the Station was the development of a successful agriculture to meet the situation resulting from the dissipation of the timber. It was a big job and it grew bigger year by year as more and more farmers turned to Mr. Ferris for guidance.

He well outlined the proportions of his task to me when he said: "Our Station, since its establishment in 1902, has faced a problem that has not existed with the other stations of the State, nor perhaps of the nation, in that we had to serve the agriculture of a section where practically no agriculture existed — the entire time and attention of the people having been taken up with timber. The general idea, at the beginning of our work in 1902, was that cut-over lands were too poor to have agricultural value, and it has required actual demonstration to prove the contrary.

"We feel that the work of this Station is better appreciated now than ever before in its history," he added. "There are several reasons why this is true: The Station is older and our people have come more and more to look to it for guidance in agricultural affairs; it is getting better support in recent years enabling it to start new lines of work, notably that with fruit and truck crops, under supervision of specially trained men; and as the timber has been removed the people are slowly but surely coming to a realization of the fact that

agriculture is their only present dependence and they are more ready to accept the teachings of experiment station workers.

"Better roads and the more general use of automobiles, with the fact that most of our counties have agricultural agents who lead parties on visits to the Station, have served to greatly popularize our work," he continued. "Numerous delegations of farmers, business men, students and teachers of agriculture have made a study of our experiments. The conducting of cooperative experimental work in several counties has brought many people into more intimate touch with our work. The people are coming to realize that they have a valuable asset in their cut-over lands and that when intelligently handled these lands can be made as productive as the richest natural soils. The work of this Station with fertilizer has played no small part in bringing about such a realization."

The fact that the soils of the section are not naturally fertile constituted the biggest problem that Mr. Ferris and his coworkers had to face. From the first it was found that a few years' cropping sapped the meagre fertility. The plants were eager to make vigorous growth in a soft climate that compares favorably with that of the fruit growing sections of Florida and California although the winters are slightly more severe and there is more rainfall.

The sandy texture of the soils is at once a curse and a blessing. Although they contain little or no natural fertility their physical condition is ideal. Their almost mechanical perfection and the abundant rainfall they receive make them highly responsive to the proper use of fertilizer.

Dependent on Fertilizers

"The largest problem connected with the development of a permanent agriculture in this vast territory of South Mississippi is that of building and maintaining soil fertility," Mr. Ferris said. "In their natural state the soils are so poor that any kind of farming is unprofitable without fertilizer or manure. As the latter is practically non-existent, the country as a whole is dependent upon commercial fertilizers. Hence, the primary work of our Station has been that of determining the exact needs of these soils for fertilizers and the cheapest

This companion plat was fertilized with 240 lbs. of acid phosphate, 90 lbs. of ammonium sulphate, and 240 lbs. of kainit per acre. The total yield per acre was 1017 lbs. of seed cotton, an increase of 378 lbs. over the check.

and best means of supplying them.

"Such a determination is not as simple as it would seem," he added, "and new problems connected therewith are constantly arising. So one of the main lines of work here has been and will continue to be along fertility lines, the finding of the proper amounts and proportions of the needed plant food elements for the many crops.

"On hundreds of plots here and elsewhere over the section, we are working out these problems by carefully planned experiments agreed upon at conferences held annually at the State Agricultural College where the best thought of the agricultural workers of the State and the leading fertilizer men of the South is brought into play. Such experiments are carried out not only at the Station proper, where fertilizer tests are made with various crops on more than 300 plots, but also with farmers in several counties through the cooperation of the county agents," he concluded.

It is necessary to carry these experiments on diligently and constantly because the plant food demands of the soils are continually changing. What was a good fertilizer a few years ago may be an unbalanced plant ration today. For instance, not long ago the Station recommended a fertilizer analyzing eight per cent phosphoric acid, four per cent nitrogen, and two per cent potash for cotton. Although this was a good cotton mixture at that time, under present conditions it does not contain enough potash to feed the plants and help them resist rust and wilt. The potash in the cotton fertilizer recommended today has therefore been increased.

Important Information

Such information is important to the section because, similar to the remainder of the South, its major cash crop is cotton. Mr. Ferris says that by using the best varieties and the recommended methods of culture and fertilization it is possible to grow cotton in the coastal plain section as successfully as it is grown in the Mississippi Delta, which is famous for its

(*Turn to Page 56*)

Bright tobacco has been introduced in the last few years.

Why Credit Stays High

¶ Some farmers pay as high as fifty per cent per annum for short term credit

By Arthur P. Chew

U. S. Department of Agriculture

SO much has been done to make credit cheaper for the American farmer in the last 10 or 12 years, that we are apt to regard the agricultural credit problem as more or less solved. With the Federal reserve banks and the intermediate credit banks and the farm loan banks standing ready to siphon funds from money centers to points where capital is needed, it is hard to believe that there can still be serious local shortages of credit in the United States. But if you live in certain regions, and till the soil for a livelihood, your short term credit may cost you 20, 30—yes, 50 per cent per annum.

That sounds incredible. Yet it is vouched for on the highest authority—that of the United States Department of Agriculture. In a survey made a few years ago in Georgia and North Carolina, the department found areas in which the average rate of farmer-credit was 24.3 per cent. Individual cases were found in which farmers were paying as high as 50 per cent. Another study made this year in the same general region has revealed that such conditions still exist.

To be sure the kind of credit in question here is not bank credit. It is merchant credit. Farmers in many parts of the United States are unable to obtain from banks all the short-time credit they need. It is consequently necessary for them to have recourse to merchants and dealers of various kinds, who naturally insist on being well paid for doing a banking job as well as a trading job. Farmers who use merchant credit seldom know what it costs them, because ordinarily the cost is not based on a fixed interest rate but is covered in a higher price paid for supplies purchased on credit. That is how they come to be charged such terrific rates.

But the mere fact that this credit business is done through merchants rather than through banks does not make it less of an evil, or less of a blot on our credit system. Indeed, the contrary is true. Why must thousands of farmers struggle along without adequate banking facilities? Most of this high-cost merchant credit is well secured by chattel mortgages or crop liens. It is a clear case of neglected opportunity by bankers. Merchant credit is a miserable substitute for adequate bank credit. Its cost is prodigious, and it often deprives the farmer of all control over the marketing of his crop. What is wrong with our banking system?

No Shortage of Funds

Well, first of all we may dismiss the suggestion that the trouble is a shortage of loanable funds. This country is the greatest reservoir of fluid capital ever known. It is ladling capital out abroad at the rate of about five or six billion dollars a year—not always on very good security. At this writing a 3½ per cent Federal reserve rate in New York is contemplated. That

means the country has more money looking for investment than it knows what to do with. Our problem is to find out why more of this cheap money does not seep down to the farmer at low rates of interest.

It is true, of course, that interest rates on short-time loans for farmers have dropped considerably in the last 10 years or so. Moreover, they have declined most where they were formerly highest—particularly in some of the southern states and the mountain states. Anyhow, bank credit has. In Oklahoma, for example, the average rate on short-term agricultural loans declined 2.6 per cent from 1914 to 1923, and declines almost as substantial were recorded in other agricultural states. But 10 per cent is still a common charge—when extras are included—in many southern and western areas, whereas farmers in the New England and the North Atlantic states can borrow money at 5 per cent. What other business shows an equal spread in credit charges?

Ask the banker for an explanation, and he will probably tell you that interest rates are naturally high in regions where the demand for capital exceeds the supply and where the risk on loans is exceptional. Certainly the factor of risk must be allowed for. Climatic conditions affect interest rates through their influence on the amount and the variability of farm incomes. Perhaps interest rates will always be higher in the semi-arid, one-crop regions than in the humid, diversified regions. But should the spread be as large as it is? And as for the banker's suggestion that rates must be relatively high where the supply of loanable funds is small, the obvious retort is that there ought not to be any place in the United States where the supply of loanable funds is inadequate.

There would not be if money found its level rapidly like water, but it behaves more like molasses. Or perhaps it would be better to say that the fault is not a natural lack of fluidity in the money supply, but lack of channels and conduits to move it around properly. Money circulates all right through the main arteries of finance and trade, but not in the minor blood vessels. If there is high pressure around the vital organs of our economic system, in the great money centers, the stream often runs mighty thin at the extremities. It gets thinner visibly, as rising interest rates show, when you move away from the industrial East toward the agricultural South and West.

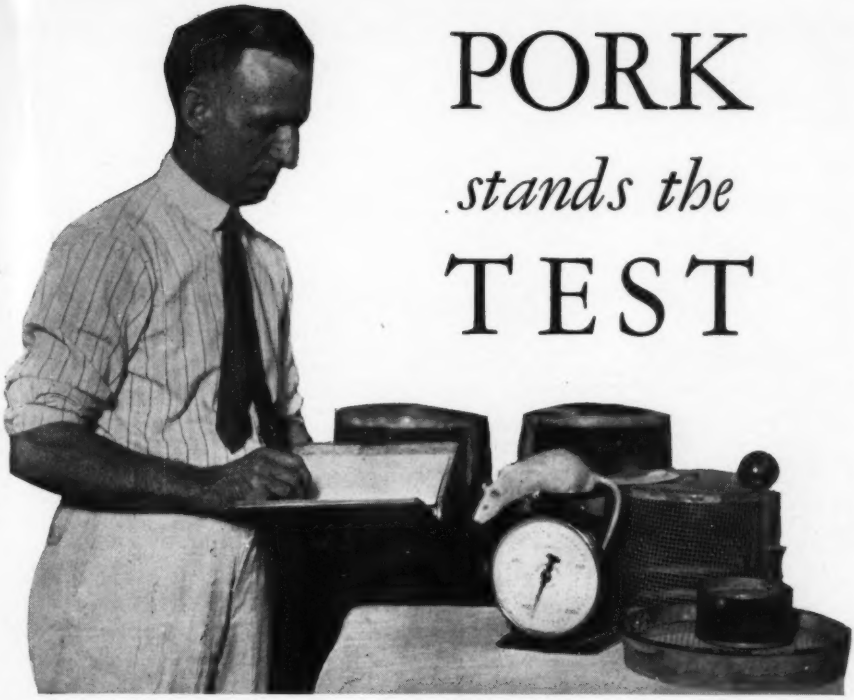
Credit Facilities Inadequate

All the causes of unduly high agricultural interest rates can be reduced to two—the risk of lending and an insufficient supply of funds. There will naturally be differences of opinion as to which of these factors is the more important in determining the level of interest rates in various sections of the country. It is not necessary to minimize the importance of the former in order to make out a case which will show that local shortages of funds, due to a clogged circulation system, are pretty significant.

The truth is that our agricultural credit facilities are still wofully inadequate. This does not mean that there are not enough country banks. In some states there are too many. North Dakota in 1920 had one bank for every 732 persons in its population, compared with one bank for every 12,625 persons in Rhode Island. North Dakota would have been better served with fewer and better banks in the last few years. What agriculture needs is not necessarily more banks, but banks with improved channels of communication between themselves and the big money centers. It must be made easier for money to flow from New York and Chicago to the small local bank that serves the farmer.

A small banker sized up his problem for me recently. It seemed to me that it helped to explain why credit is often

(*Turn to Page* 60)



PORK *stands the* TEST

WITH a large supply of pork in the hands of packers and prospects for lower priced hogs if consumers do not whet their appetites for sausage, ham, bacon, and spare ribs, the hog producers are going to have a rough time of it. But Ralph Hoagland, a biochemist of the U. S. Department of Agriculture, comes out with some cheering information regarding pork products which may increase the consumer's interest.

For one thing, Mr. Hoagland has proved from his experiments that the public's desire for pork in combination with certain other things is on a sound scientific basis. He says it is not an accident that produced the combinations familiarly known as ham and eggs, pork and applesauce, ribs and kraut. The combination of bread and ham in the popular ham sandwich is a good balance, and the fact that this is so may account for the great popularity.

This government scientist has used 4,000 albino rats in his feeding tests, selecting these animals because their food requirements are similar to those of man. Many valuable results have been obtained, one of them being the discovery that lean pork is rich in vitamin B but low in the fat-soluble vitamin A. Right here is the reason for the success of the ham and egg partnership. Eggs happen to be low in vitamin B but rich in fat-soluble vitamin A. For the same reason bacon and eggs have retained popularity with the public.

It has been known for some time that there is a great variation in the food value of proteins from different sources. Those from lean meat, fish, milk, and eggs have a higher nutritive value than those from such foods as wheat, corn, rice, navy beans, and oats. One of Mr. Hoagland's objects was to find the value of the protein in pork and the proteins of some other meats when they are eaten with grain products and vegetables. A result

(*Turn to Page 56*)

INDIANA

By T. R. Johnston

Purdue Agricultural Experiment Station

THE "Service Station for Indiana Agriculture."

This sobriquet, many times applied to the Agricultural Experiment Station at Purdue University at Lafayette, Indiana, may be true for other experiment stations, but it is particularly outstanding in the Hoosier state. There is not a class of farmers, from the corn and hog producers in the typical corn belt area of the state, to the dairymen of the north or the fruit growers of the south who have not brought problems to the experiment station and received the help so necessary to the success of farming today.

With one of the largest staffs of research men in the country, 92, and situated in the eastern part of the great surplus food producing area of the United States, the Indiana Ex-

PURDUE

is the seventeenth visit in our tour of agricultural experiment stations. Note the excellent photograph of the experimental plots

periment Station at the state's Land Grant College is strategically placed to give a maximum of service. And it does.

Not long ago the writer was on one of the many tours used nowadays to impress on a group this or that practice.

"What does Purdue say about it?" or "What have the experiments at Lafayette shown?"

These two questions, put by dozens of men during the course of the trip, not merely on alfalfa, which was the particular project under discussion, but on everything from feeding a litter of pigs to reach the ton mark in six months, to spraying an orchard to control codling moth, were among the queries of the farmers taking part in the tour. They sought to learn

This plow has a rotary attachment for pulverizing the furrow slice.

what results the Experiment Station had obtained in solving the questions they had in mind.

This little incident is given because it is common at every meeting of farm men and women over the state. It illustrates the confidence which the Hoosier farm folks have in their state experiment station and school of agriculture.

Founded back in 1888, under provisions of the Hatch and Adams acts, the Experiment Station undertook at once several fertility tests. The half acre plots, laid out a year or two previous to this time by Prof. W. C. Latta, the original professor of agriculture at Purdue, are still intact with experiments going on there each year.

Prof. Latta was the director, staff, and instructor, all in one for the first experimental work, but with the development of Indiana agriculture, the research work has reached bounds undreamed of even a decade or so ago.

The original five acre tract set aside for experimental work, deemed at that time entirely adequate, has grown to no less than 20 farms and fields scattered over Indiana, all on different types of soil. Their total acreage is approximately 2,600, and more than 200 projects, seeking the answer to the questions which Hoosier farmers have asked or will ask, are

Experiment Station offices and laboratories are in this building. Above are Dr. E. C. Elliott, President of Purdue University; and J. H. Skinner, Dean of Agriculture.

under way on these farms. In addition, hundreds of farmers over the state are cooperating with the research workers in seeking further light on many questions. Only last year agricultural graduates and former students were enlisted as a body to help in the soils and crops work, and more than 500 are cooperating in this experimental work which is followed later as demonstrations.

Oat Smut Control

Indiana for many years has been a heavy producer of oats. More than 20 years ago, smut became so bad in this crop that it threatened to put the farmers out of the oats growing business. Dr. J. C. Arthur, now professor emeritus of botany, working on the problem with his usual vigor, learned that formalin would control this disease. Today, not only the farmers of Indiana but wherever oats is grown know and use this treatment, worked out in the laboratory almost a quarter of a century ago. Similarly Dr. Arthur adapted formalin to the control of potato scab, which was perhaps the most serious potato disease in Indiana. Treating of potato seed is now a common practice, thanks to the extension service and the knowledge taken out to the farmers.

(*Turn to Page 50*)

Wheat on Murdock Farm, Tippecanoe County, Indiana. Above are Dr. G. I. Christie, Director of the Experiment Station; and H. J. Reed, Assistant Director.

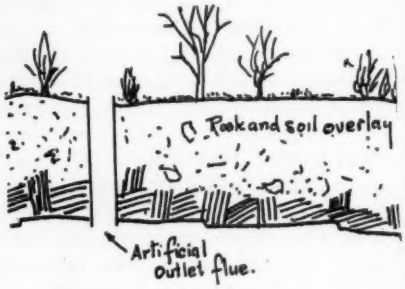
Storing Apples

By C. E. Baker

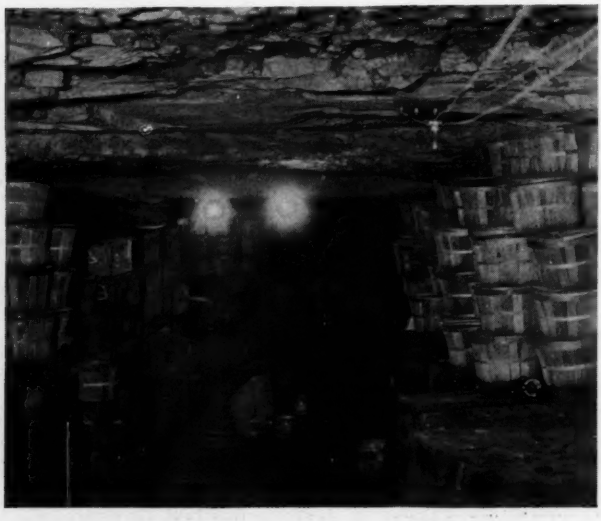
Purdue Agricultural Experiment Station

THE development of farm storage houses for apples during the last few years has brought forth some ingenious adaptations of already existing structures into structures for holding apples during the winter months. Home basements, deserted school houses, barns, and various other buildings have been converted into satisfactory air-cooled storages to prolong the season of marketing fruit from the farm.

What is undoubtedly one of the most interesting and novel undertakings of this kind has been conducted by the Burton Fruit Company of Mitchell, Indiana, in utilizing a natural limestone cave for apple storage. The orchard is situated near the seat of the Bedford stone industry and is near the center of an area covering many counties that is entirely underlain with deep limestone deposits. These deposits are characterized by caves, caverns, and underground rivers; open caves of the kind made use of in this instance being common throughout this section of the state.



Natural Limestone Cave



Realizing the necessity for storage facilities to care for a large commercial crop of apples, the company experimented with caves and found that they would provide very satisfactory storage conditions if sufficient ventilation could be secured. After this preliminary investigation, a large cave was leased by the company, and work was begun

to fit the cave for its new duties.

The first work necessary was to remove the debris from the bottom of the cave. As the floor of the cave was considerably below the level of the mouth, a large amount of soil had washed in. This, together with the loose rock along the walls and ceiling, was removed, and the cave was given a general overhauling and cleaning.

Irregularities in the floor were removed, and the depressions were filled with cement to give a level surface. Cement steps leading from the floor of the cave to the mouth were also provided. The finished cave has headroom varying from 10 to 14 feet; the greatest length is 130 feet; its greatest width 50 feet, giving a storage capacity of 10,000 to 12,000 bushels.

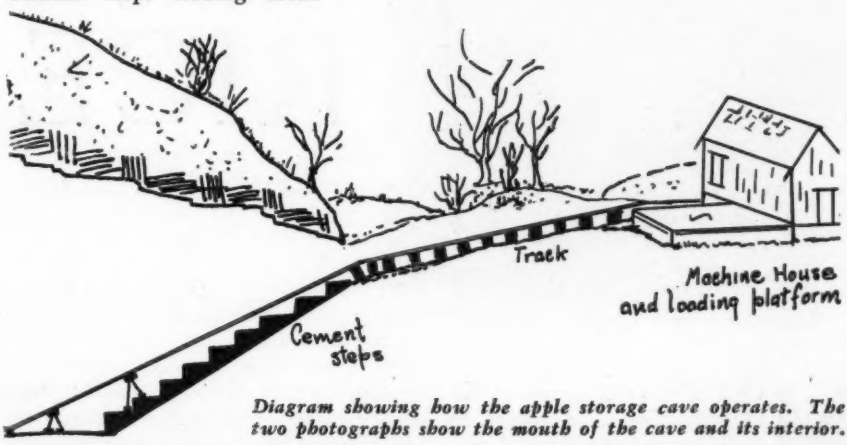


Diagram showing how the apple storage cave operates. The two photographs show the mouth of the cave and its interior.

As this cave had no natural outlet of sufficient size to provide adequate ventilation, it was necessary to cut an artificial warm air outlet flue from the top of the cave up through the rock and soil to the open air above. An electric fan to force the air up this flue was installed at its base. Electric fans also are placed at the sides of the cave to circulate air toward this flue.

The mechanical devices made use of in operating this storage cave are likewise very interesting. The windlass which lowers and raises the car is housed in a small building at the head of the track about 100 feet back from the mouth of the cave. The windlass is operated by a Ford power plant to which it is directly connected in such a way that the car may be either raised, lowered, or stopped at any point by a skillful manipulation of the Ford transmission system. The same motor drives an electric generator which operates the lights in the cave and the electric fans. When the Ford power plant is not in operation the electric generator may be run by a small one

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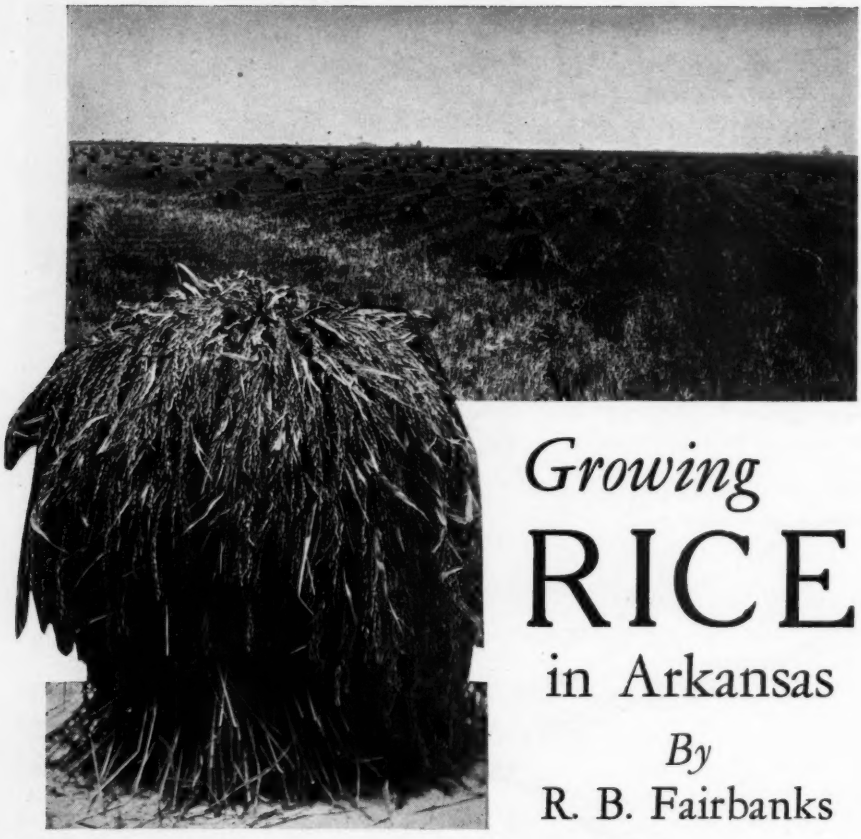


Growing RICE in Arkansas

By R. B. Fairbanks

MOST of the rice grown in the United States is grown in the South, the leading sections being the Stuttgart region of Arkansas, Southwest Louisiana, and Southeast Texas. The methods of growing rice in the Stuttgart section are probably as intensive and up-to-date as can be found anywhere.

Large areas of comparatively level land are necessary for rice growing, in order that the irrigation water may be controlled for flooding the fields of rice. Practically all of the rice lands are prairie or level lands and near unfailing supplies of fresh water. This is necessary because of the large amount of water needed for growing this crop.

A humid, warm climate is needed to grow a good crop of rice. A comparatively long growing season is necessary, some of the varieties requiring four and a half to five months from the time the seed is sown until the grain is mature. When the temperature runs up to 90 to 100 degrees in the middle of the day and the humidity from 85 to 95 per cent, conditions are ideal for the growing of this crop.

Soils with a porous subsoil are not suited to rice growing. What is wanted and what must be had is a soil that has quite an impervious subsoil in order that the irrigation water will stay on the land and not seep down through it too rapidly.

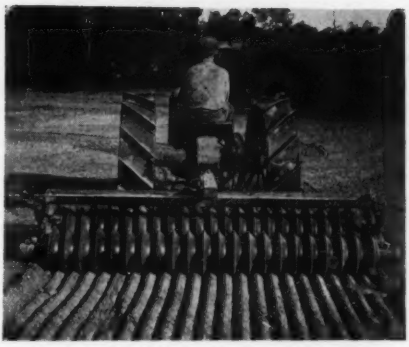
Thorough Preparation

Despite the fact that rice makes most of its growth with several inches of water standing on the

ground, soil on which it grows must be aerated. After a few years of being flooded for rice growing, the soil becomes very much in need of aeration and farmers have learned that the best way to accomplish this desired result is by the thorough preparation of the soil before the seed is sown.

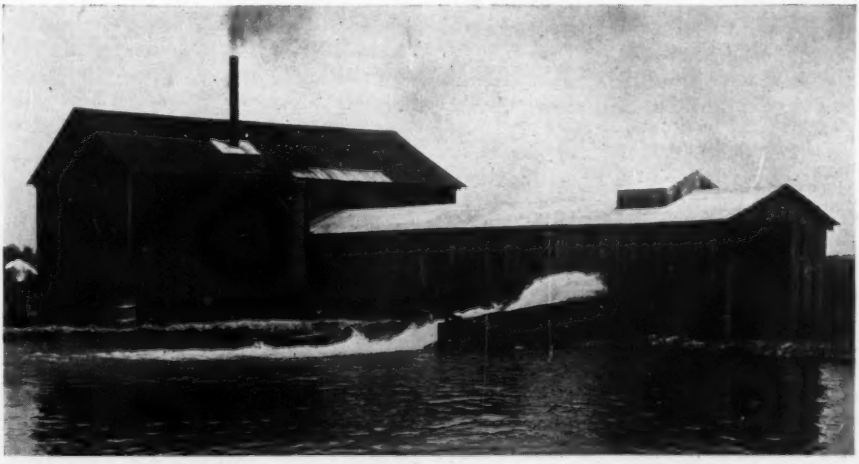
Usually the preparation of the soil for the rice crop is started in January or February. The soil is flat broken, and shallow, say three to four inches deep. Then it is harrowed with a disc harrow, often being gone over several times with this implement. Then follows a section harrow. This in turn, is followed by cultipackers. The ground is gone over a sufficient number of times to put it in a most thoroughly prepared condition. On an average it is harrowed at least five or six times before it is properly stirred and aerated.

If the weather is not suitable for plowing in winter or early spring, the ground is often plowed while wet. It is often plowed when there is much water on the ground, and the rice is sown broadcast in the mud and harrowed in. This method, of course, is not desirable, but often fairly good crops have been produced under such conditions. When a crop is planted in this way, it simply means that it is all the more necessary to thoroughly plow and harrow for the next crop.



A cultipacker in a rice field.

Just before the rice is to be planted the fields are surveyed and levees, very similar to terraces, are built for irrigation purposes. These are usually built on level contour lines and are two inches in elevation between each other. They are thrown up about 18 inches high and about eight to ten feet broad. Rice is planted right across the levees. The rice on these levees grows and produces just as good a crop as in between the levees but usually matures a few days later.



Pumping station on an Arkansas rice farm. Note that much water is stored in the reservoir. Usually, however, the water flows directly from the pump to the fields.

The planting is usually done with grain drills, such as are used for other small grain, as wheat and oats. Some sow the seed with broadcasting machines and the seed is harrowed in to cover it. The drill method, however, is considered to be the best.

Most of the rice is planted in April, May, and June, the biggest portion of it in May. Fertilizer is applied at time of seeding, being put in with a fertilizer attachment to the grain drill. Where the grain is drilled the rows are six to eight inches wide. About two bushels. or 90 pounds of rice, are used to seed an acre. This is the rough rice just as it comes from the threshing machine, and not the clean rice that we are familiar with as eating rice.

The following varieties are planted, the first named being the most largely planted, the second named the second most largely planted, etc., in the Stuttgart section: Blue Rose, Early Prolific, Japan Rice, Honduras, Lady Wright, Edith, Mortgage Lifter. The bulk of the crop in the section is of the Blue Rose and Early Prolific varieties. The Blue Rose is later than the Early Prolific and is a heavier yielder. Even though the Early Prolific does not yield quite so heavily as the Blue Rose, it is a desirable variety because of being earlier, therefore, higher prices are usually secured for it. The quality of the Early Prolific is not quite so good as that of the Blue Rose.

Potash Gives Good Results

Until the last few years fertilizer had not been used extensively in the Arkansas rice belt. It is not used very extensively now, but more and more the growers are beginning to realize that they can use it profitably. Tests show that potash is needed to make hard seed and to give strength to the straw. Much rice is lost from the weak straw, and for this reason, indications are that a reasonable amount of potash should always be used. Acid phosphate alone seems to do no good. A complete fertilizer, however, seems to give profitable results. Some of the growers like a 10-4-4, others use a 12-4-4, and still others prefer a 10-4-2. It is desirable that the nitrogen used in the fertilizer come from sulfate of ammonia. The theory is that nitrate of soda undergoes a chemical change under the water that is injurious to the rice. From 200 to 500 pounds of a good high grade fertilizer is apparently desirable on rice.

When rice is up three to four inches high, which is usually about four to six weeks after planting, water is turned on until it is about four inches deep all over the surface of the field and nearly covers the rice. The pumping of water is continued from this time until harvest time comes, so as to keep about four inches of water on the soil.

In order to control the root maggots, it is customary to keep the water on the rice 18 to 20 days from the time it is first applied. Then the water is drained off entirely, and the field is kept dry for 14 days, when the water is again turned back, and the field is kept flooded for the balance of the season or until harvest time.

Equipment Cost High

Cost of equipment on the average Arkansas rice farm is heavy and is about as follows:

Pumping plant outfit	$10,000
Two tractors	1,500
Plows, discs, harrows, drills, etc.	1,000
One binder	300
Threshing machine	1,400
One truck	1,000
Total	$15,200

To cover interest and depreciation of equipment, 20 per cent should be added to the above each year to get at actual cost.

Rice growers generally consider the cost of production, including harvesting, threshing, and hauling to market, interest and depreciation, approximately $1 per bushel. Some years

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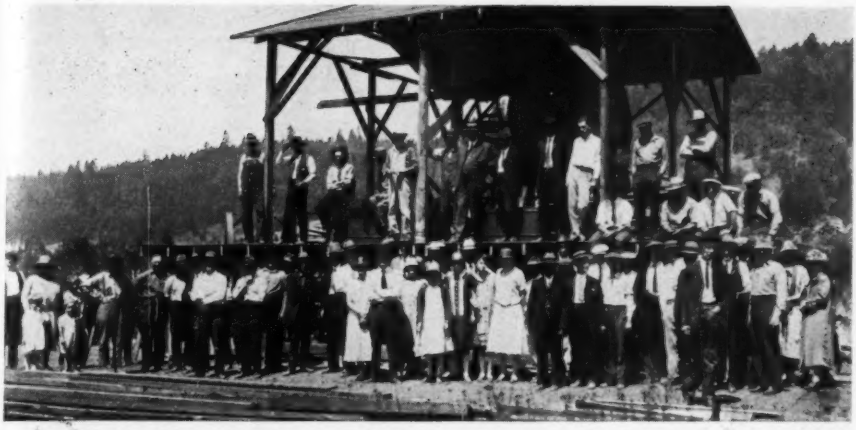

A. C. Brown's mint still being investigated by Douglas county, Oregon farmers with County Agent E. W. Cooney on a mint and vegetable tour.

HERE's another money-making

MINT

By Guy A. Peterson

Madison, Wisconsin

MINT farming is going West. It is becoming more and more common with Oregon and Washington farmers near the coast, as they find that they can produce a fine quality of oil with less danger of frost than is encountered in southern Michigan and northern Indiana.

Most of the mint in the United States has been produced in Michigan and Indiana since the muck land owners in these districts wrested the industry from the upland farmers in Wayne county, New York. From 1815, when the industry is said to have reached mature proportions, until 1889, the growing of mint was a prosperous undertaking in Wayne county. However, more favorable conditions in the Mid-west made it unprofitable for the New York producers to continue growing this crop. Consequently the acreage in that state practically has fallen to zero.

A number of men now predict that the Northwest will ultimately produce most of the mint crop in the United States. They believe that many mint growers in Indiana and Michigan will soon use their muck lands for raising celery, cabbage, and other vegetable crops which can be marketed in the near-by population centers.

One writer states that yields of 50 and 60 pounds of oil per acre were formerly common around Mentha, Michigan, where the first Michigan plantings were made in 1835, but that 25 pounds are now considered good as the State average in some years is only about 11 pounds. Indiana's 1926 acreage was 47,000 and that for Michigan was 11,800. It is generally estimated that the United States pro-

Mint hay loading scene on the Hayes plantation near Silverton, Oregon.

duces three-fourths of the world production of mint and peppermint oil.

Oregon's mint industry was started about 20 years ago on a small scale. It was not until after the 1925 freeze which almost wiped out the mid-western crop and caused the prices of oil to rise to nearly $25 a pound, that the acreage increase really began.

According to A. G. B. Bouquet of the Oregon Agricultural College, Oregon increased her mint plantings from 500 acres in 1925 to 3,000 acres in 1926. Washington likewise had a tremendous acreage increase in the Puget Sound district, as well as in some of the coast counties farther north.

G. J. Moisan of Gervais, Oregon, has been growing mint on rented areas for a number of years. He says that the production range on peat ground near Gervais is from 40 to 100 pounds an acre. Many growers get from 70 to 85 pounds, although the average for the state is probably not much more than 30 pounds. In 1925 Moisan sold $21,000 worth of oil from 28 acres and disposed of 17,000 sacks of mint bulbs at $1.25 a sack. He got 900 sacks of roots from a single acre, but he says that is an abnormally high yield. It takes about 30 sacks of roots to plant an acre.

"In spite of these returns when prices are high," he declares, "quite a number of growers have made a complete failure with mint by not knowing how to grow it or from trying to raise it on land unadapted to mint culture. You want a soil with plenty of moisture, but it must be well drained. Good onion-growing land makes good mint land if the climate is right, but you want warm growing weather in the spring and rather hot humid weather in July so the oil cells will form on the under side of the leaves. Mint can be grown on up-

(*Turn to P. 57*)

A. C. Brown, first mint grower in Douglas county, with Mark N. Tisdale, banker and fruit grower, standing in Brown's 20 acres of new planting.

Queen Alfalfa Smiles on the Shenandoah Valley

By W. L. Myers

THERE is an old saying in the North Central States—"Corn is King—Queen Alfalfa, Oh You Princess Cowpeas."

While corn may still be King of the crops of this region, the army of European corn borers that only recently invaded the corn belt bids fair to force a surrender.

Alfalfa and other legume crops are not injured to any great extent by the corn borer. Fortunate indeed is this, for alfalfa being one of the best animal feeds will protect stock raisers from the serious losses they might otherwise suffer.

Farmers should begin to groom their fields for successful alfalfa crops. It would be foolish to wait until the corn borer has done its work when if proper steps were taken, alfalfa, the Queen, could be ready to play her rôle as a soil builder and profit maker.

There are certain essentials for successful alfalfa growing. First, one must have determination. With all other conditions ideal, the lack of determination to grow it means that very little will be planted or that areas planted will be neglected.

Best crops of alfalfa result only on well drained, sweet, weed-free soils. Soils of average fertility will grow splendid crops, but require careful fertilization at time of planting and from time to time top-dressing with fertilizer mixtures suited to the soil and crop.

Thorough preparation of the seed bed is important. The soil should be tested and if acid, an application of

(*Turn to Page* 45)

This alfalfa, grown in the Shenandoah Valley, Virginia, was fertilized before seeding with 400 lbs. per acre of 0-13-6 and top-dressed in the spring of the second year with 300 lbs. of 0-13-6.

Merrimack Potatoes

By E. W. Holden

County Agent, Merrimack County, New Hampshire

ALTHOUGH Merrimack county, New Hampshire, is not a large potato producing area, an unusual interest in potato farming has developed during the past two or three years. It is developing rapidly as a major business on many of the general farms formerly engaged in straight dairying.

A few years ago most growers raised their potatoes in a far from up-to-date manner; there were few power spray outfits; considerable hand work was done; and 500-1,000 pounds were the standard of the commercial fertilizer used per acre. Today such methods have been completely revised. Growers have increased their acreage so that they have been able to afford the most modern potato machinery; they have greatly increased in their use of certified seed; have given their soil better preparation; and have doubled their fertilizer application.

Part of the interest of this section is undoubtedly the result of the general prosperity enjoyed by all engaged in potato farming in the past two seasons. There is another more important factor, however, in the increased activity in this branch; a campaign of the Merrimack County Potato Growers Association to supply its own markets with locally grown potatoes.

At the present no potatoes are exported from the county, while during the winter months many cars are imported from competing regions into the cities and towns. Local growers enjoy a market which prefers its potatoes, and marketing is only a matter of hauling to town and unloading at the door of the local storekeeper. There are no freight rates to pay and no commission charges. With such conditions existing, potato growers in

Spraying potatoes to control late blight and other diseases and insects.

This ten-acre field of H. E. Webster of Salisbury, N. H., won first prize in the New Hampshire Potato Contest with an average yield of 387 bushels per acre.

this particular section have a unique advantage which is enjoyed by farmers of few counties. They have a superior market which asks for a home-grown product which it is forced to buy from outside sources because there is an insufficient supply at home.

The greatest change of this two-year period in the culture of the crop has been in the preparation of the soil and in the increased use of fertilizer. This has been the result of the efforts of the local association in campaigning for "greater yields at less cost." Two Merrimack county growers were first and second prize winners in the 300-bushel contest conducted by the New Hampshire Extension Service last year. H. E. Webster, of Salisbury, had an average yield on 10 acres of 387 bushels per acre and W. E. Currier, of Danbury, raised an average of 339 bushels on five acres. The success of these men can be attributed chiefly to the preparation which they gave their fields before planting. Last year was exceedingly dry in this section, yet these men had good yields because they plowed and fitted their land in excellent shape.

The common practice of a few years ago was to select for potatoes a field which had been in sod for several years, manure it heavily, and apply 500-800 pounds of fertilizer in the drill at planting. The success of progressive farmers has proved that greater applications of fertilizer and less manure secure the greatest yields. Today, nearly all potato farmers use from 1,500-2,500 pounds of fertilizer per acre. If manure is used, a light application is made in the preceding fall, yet most growers prefer to use it for other crops, working potatoes into a rotation so that they will be planted on land that is in a fertile condition.

The common 5-8-7 and 4-6-10 have been the popular grades; 800-1,000 pounds are applied in the drill and the balance is broadcast after the plants come up. Potatoes are practically the only crop raised in this section which succeeds as well, if not better, without heavy applications of manure.

Where Insects Winter

By Don B. Whelan

University of Nebraska

WHY is it that most farmers conduct a winter resort for insects? Year after year they make conditions ideal for these little pests to pass the winter unharmed. It is a well proven fact that many of our worst farm pests spend the winter in and under weeds and accumulations of crop refuse.

During the winter months insects are inactive and can be controlled more easily. Many insects spend the winter in the egg stage, some on weeds near the host plant, some on the remains of the host plant itself, others in the ground or trunks of trees. Other insects hibernate in the larval stage, generally within silken cases or cocoons of some sort. The adults often stay under trash, stones, or else a few inches in the ground itself.

If all weeds were cleared from the vicinity of the garden in the fall, or from our fields, by community effort or otherwise, some of our worst pests would soon be forgotten. Some insects like the flea-beetles pass the earlier part of their lives on the roots or leaves of weeds, and later, in their adult stage, they prove to be quite a pest of some of the farm plants.

Many of the most destructive plant-lice, or aphids, spend portions of their lives on weeds. The remainder of the time they satisfy their hunger on some particular crop. Thus the rosy apple aphid spends part of its time feeding on the narrow leaf plantain. The potato stalk-borer spends the winter as an egg on ragweed. The potato tuber-moth, a very serious pest of potatoes in California, breeds on weeds, as also does the potato flea-beetle. Weeds not only occupy needed space and take nourishment from the soil, that is necessary to the plants, but they are the bridge that carry many of our worst pests over winter.

It is a common practice, when a crop has been harvested, to allow the remnants of the plant to remain on the ground all winter. This is often true of the stumps of cabbages and cauliflowers, and very often the melon and squash vines that have been killed by the frost. The stubble of corn proves to be an ideal hibernating place, as does the sheltered ground under the shocks of corn. On the leaves and stumps of cabbages in winter, will be found the eggs of the cabbage aphids. The writer has bred the adult of the cabbage maggot from rutabagas that have beeen frozen in the ground all winter. The squash-bug and the tarnished plant bugs live under garden refuse, or in sheltered places near the field, during the winter season. These remnants of the past season's crops are a big source of next year's insect pests and should be cleaned up and either burned or buried, if it cannot be fed.

There are many other ways in which a little care and foresight will save the farmer much future trouble. If he can destroy the breeding places or the hibernating retreats during the time of the year when these places are vital to the insect's existence, he will enjoy a greater freedom from their attacks the following year. For instance the plum curculio, the little snout-beetle that stings the apples, plums, cherries and other fruits, spends the winter in the grass or rubbish in or

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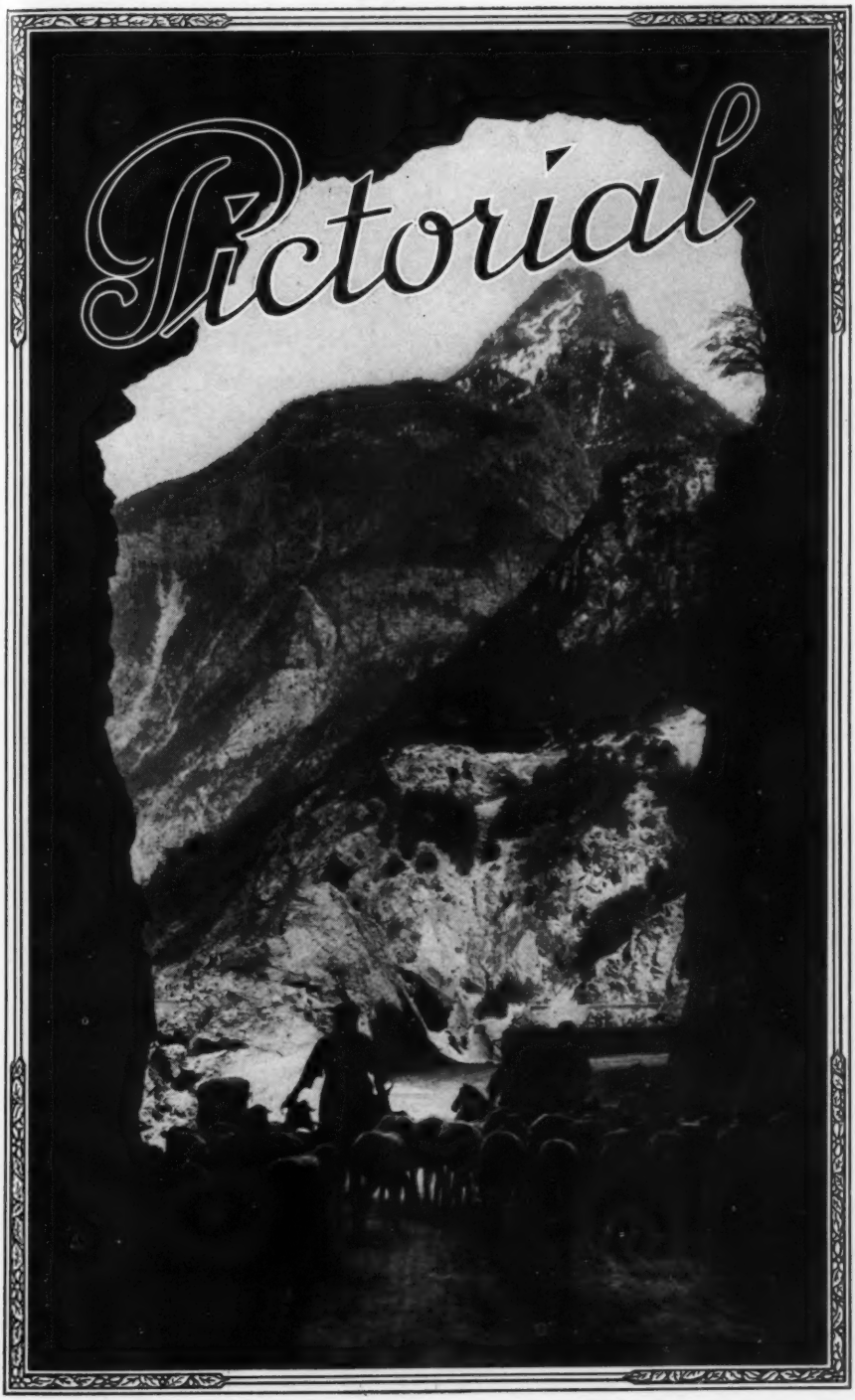
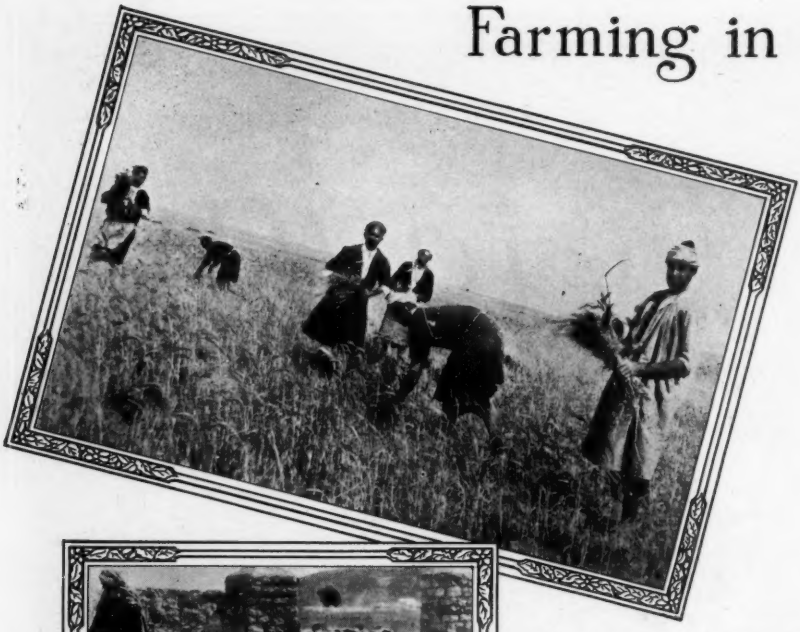
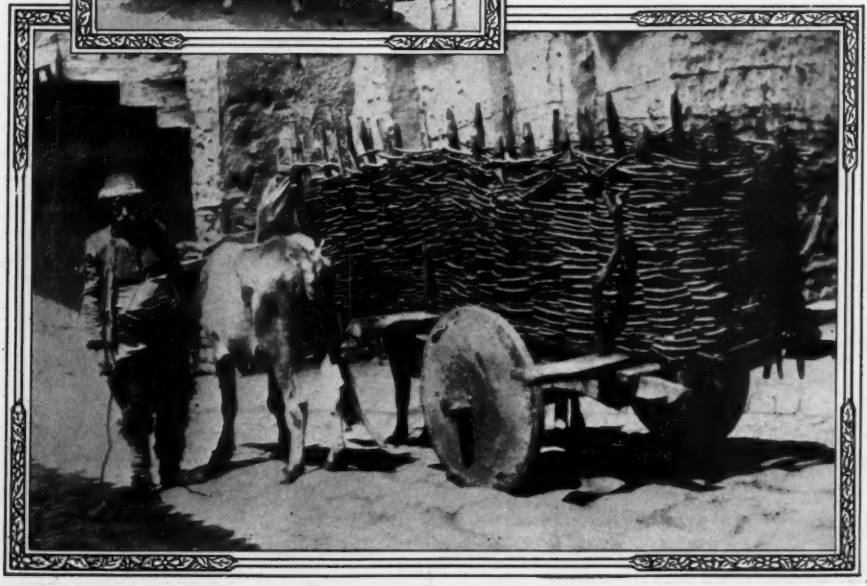

Pictorial

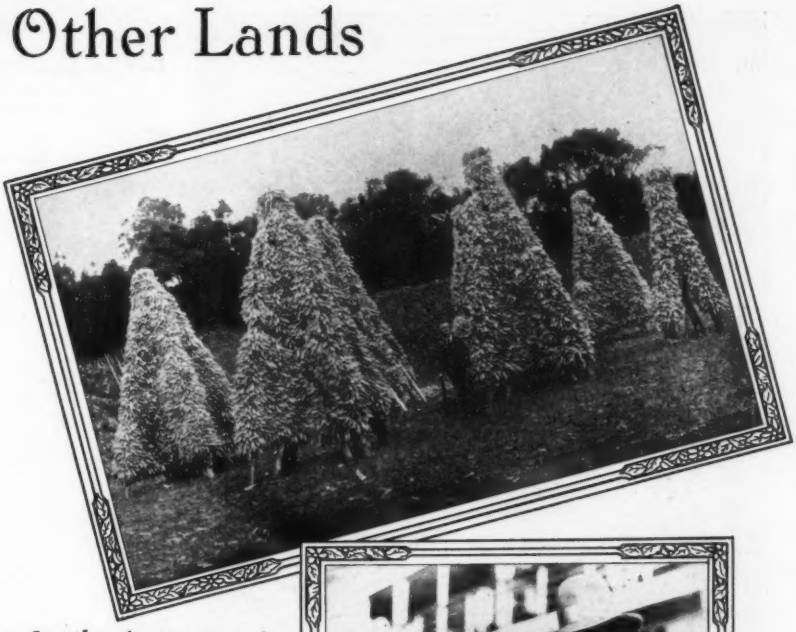
Farming in



Above: Moroccan farmers employ harvesting methods a thousand years old. Left: Sheep in a Saharan market place are held by locking their horns together. Below: This ox-cart was handmade by the Turkish farmer, even to the smallest peg.



Other Lands



Above: In the Azores corn is stacked in this manner to dry. Right: Sir Sidney Kidman and Lady Kidman of Australia. He controls some 30,000 square miles of cattle country and owns about 200,000 head of cattle. Below: German school girls receive instruction in dairying.

Left: A good field of corn and soybeans in Coahoma county, Mississippi.

Below: Canning club girls in Hillsboro County, Florida, demonstrating the slogan "from patch to can."

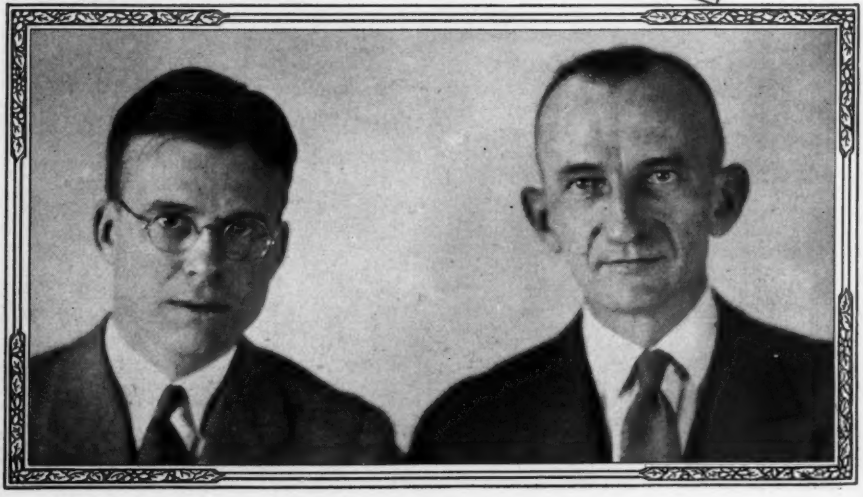
Right: Director G. I. Christie of the Purdue Agricultural Experiment Station is a keen student of practical farming methods.

Below: Chris. S. Gerber of Fairbury, Illinois, and seven good reasons why he is a hard-working farmer.

Left: Carl F. Upton of Norway, Maine, has challenged all New England to apple picking. He picked 435 barrels in 16 days. His height of 6 feet 3½ inches may have something to do with his ability.

Below: Dr. O. E. Baker, economist of the U. S. Department of Agriculture, who recently participated in the meetings of the Institute of Pacific relations at Honolulu.

Below: L. W. Kephar, and R. L. Piemeise, of the Bureau of Plant Industry, U. S. D. A., are off plant exploring in the grazing region around Mt. Kenia in British East Africa.



The Editors Talk

I extend pity to no man because he has to work. If he is worth his salt, he will work. I envy the man who has work worth doing and does it well. There never has been devised, and there never will be devised, any law which will enable a man to succeed save by the exercise of those qualities which have always been the prerequisites of success, the qualities of hard work, of keen intelligence, of unflinching will.—THEODORE ROOSEVELT.

Agricultural Policy

Farmers are not nearly so well off as their brothers in industry. For the satisfaction of their urban brethren who may have any doubt about it, "the present bad situation" is evidenced by the fact that though the American farmer represents one-fourth the population, he receives only one-tenth of the national income, and agriculture brings in only 3 to 4 per cent on its capital investment while industry brings in 12 per cent.

These and other reasons are discussed in the report on the conferences relating to "An American Agricultural Policy" which was part of the Seventh Session of the Institute of Politics held recently at Williamstown, Mass.

What policy was proposed, what was decided, what progress was made?

In ancient times certain of the tribes of Europe had a very simple plan. They set up a god Tuisto "sprung from the earth" and Mannus his son as the father and founders of the country and trusted them for their fortunes. But, as Tacitus the Roman reported, "Silver and gold the gods have denied them, whether in mercy or in wrath, I am unable to determine."

Today farmers are vainly seeking their share of the silver and gold. And apparently nobody is able to decide very definitely why the gods have denied them.

Let us hope, however, that it is in mercy and not in wrath, for the conference issues a salutary warning. It says, "failure to effect a satisfactory solution may well have important political results in the not distant future if the agricultural interests of the West and South can act together at Party conventions and on Election Day." Apparently the farmers will not call on the gods any more, but get down to business on their own account.

Out of this report of the conferences emerge three broad concepts: 1st, the farm situation is bad, 2nd: there is a great divergence of opinion regarding how to remedy it, 3rd: regarding progress: "At any rate it may be regarded as progress that some solution of the agricultural problem will be attempted probably within a year."

All of which may be very true, but all of which is not very encouraging for the farmer. Confusion of object and method, a lack of coordination and a

lack of understanding of all the factors which effect the situation and how they operate, are the outstanding characteristics of the present farm situation. Great gulfs exist between proposed remedies partly because great gulfs exist between the opinions of what the farmers should want and should have.

The theory seems to persist in some quarters that inefficiency on the farm must be accepted because the farm is the great primary source of the nation's moral values. But will the farmer ever be persuaded that to be poor and good is more desirable than to be industrially rich even though his morals may be in some jeopardy?

On this point the report states:

> "It is asserted that the farms produce better citizens, alert and ready to take responsibility, while city life warps 80 per cent of the people. Everybody living in town loses part of the spiritual value of living. It is contended, therefore, that the family sized farm, despite the inefficiency of many farms, should continue to be the basis of American agricultural policy, such farms producing food sufficiently so that industrial laborers will not have to give too large a percentage of their wages for food, while at the same time the farm families themselves are being paid prices high enough so that they can build up an agricultural civilization which is as attractive to at least half the country children as the urban civilization."

In other words, there seems to be an opinion that the farmer be called upon to support the nation physically and spiritually; to be the source of the nation's food values and moral values that vast industrial centres may prosper; his pay to be the moral satisfaction of reverence to gods "sprung from the earth" that grant neither silver nor gold.

More encouraging is the concept discussed in the report that some people wish to formulate a policy which will coordinate industry and agriculture. To this end farm organization must assume that corporation farming on a large scale with scientific and modern business methods is part of a program. It is argued, however, that while such a system may be more efficient, it would produce lower moral values.

Certain it is that as long as economic inequalities exist there will be unrest and dissatisfaction. When farmers "sprung from the earth" start out to solve their own problems and put their own house in order, on the basis of a "liberal plan of equality, liberty, and justice" then may we look for the emergence of a national agricultural policy that will be good for all the people.

Out of the night that covers me,
Black as the pit from pole to pole,
I thank whatever gods may be
For my unconquerable soul.
HENLEY.

Farm Outlook Better

According to a recent news release from the United States Department of Agriculture, the agricultural situation has improved during the past year. The purchasing power of farm products is 88 per cent of prewar, as compared with 83 per cent a year ago. When the purchasing power of a bushel of corn or wheat or a bale of cotton goes up, economists give it a number in order to measure it. This is commonly known as an index number. The index

number of farm prices in the United States increased from 130 in April, 1927, to 139 in August, 1927. This is encouraging.

The rise in the index number has been due chiefly to the rise in the prices of cotton, corn, apples, and beef cattle. Probably the most important change has been in the case of cotton. In December, 1926, the farm price of cotton was 10 cents; in August, 1927, it was 17.1 cents. The index number rose 55 points, from 82 to 137. Conditions in the cotton belt are much better than last year.

This is good for southern farmers who suffered last year from the bad effects of the production of a record crop. What man has tried to do—limit production—nature in a measure this year has done for him.

Quoting from the news release, the Department of Agriculture sums up this season's apparent production and returns as follows:

"It can probably be called an average year for the South; for the wheat belt, a good year in the North and a fair year in the South; for the corn belt, a fair year in the West, but a poor year in the East; for the Far West, a good year in the range states and Pacific Northwest."

Sad is the day for any man when he becomes absolutely satisfied with the life he is living, the thoughts that he is thinking and the deeds that he is doing, when there ceases to be forever beating at the door of his soul a desire to do something larger which he feels and knows he was meant and intended to do.—PHILLIPS BROOKS.

Winter Meetings

We shall soon be hearing about winter meetings for farmers, short courses at our agricultural colleges, meetings arranged by the county agents and many others.

Decide now to attend at least one short course or good meeting. Nothing means so much as knowing the people doing work similar to our own. There is a danger nowadays that because of the large number of bulletins, circulars, agricultural magazines, and printed matter available, the farmers may think they can learn all they need to know from the printed page, the "litera scripta," one highly specialized means of reaching people.

They may well ask, "Why need we go up to knowledge when knowledge comes down to us?" Quite true. "There never was a time which promised fairer for dispensing with every other means of information and instruction." But farm problems are hard to solve. This is a complicated age. Discouragement is too often the result of an effort of trying to solve such problems alone, and when difficulties confront them, men of all ages have availed themselves of the ancient method of personal discussion, of talk between man and man. To make the most of various opportunities, we must talk to the living man who knows and hear his living voice.

It has long ago been pointed out that scientific men and thought cannot "dispense with the suggestions, the instruction, the stimulus, the sympathy, the intercourse with mankind on a large scale, which meetings secure." A

man who fails to meet his fellows, to meet the men who know best what the problems are and how to solve them, misses much. His purposes and plans are only half formed, and his methods tend to be narrow and ill-founded. Books, good as they are, necessary as they are, can never take the place of the opportunities presented by short courses or meetings. Now is the time to decide to include them in the winter's program.

"It is impossible to impress upon any one that there is dignity in residing upon a farm with impoverished soil, dilapidated buildings, and an environment of ignorance."—DR. SEAMAN A. KNAPP.

A Fall Clean-Up

With the harvest well along and with as much of a breathing spell as a busy county agent ever has ahead of him, what about a little more stress on a fall clean-up on the farm?

We have our rural beautification contests of various sorts—almost every spring program includes one or more of them. But little attention has been paid to the appearance of the farm as it goes into the winter season.

If a farmer cannot be approached from a purely aesthetic standpoint, there are two big economical reasons for his picking up around his premises in the fall. One of these is the millions of dollars lost in depreciation on farm machinery left out-of-doors. That farmers are careless in taking proper care of implements is evidenced by a survey made a few years ago by a mid-western experiment station indicating that several millions of dollars were lost in that state alone through farmers leaving expensive mowers, hay rakes, potato diggers, etc., unhoused during the winter. Replacement dates on these implements had jumped ahead three or four years. And farm machinery is one of the biggest items in the present cost of production of farm crops.

The other big point in favor of the fall clean-up is the possibility of killing countless insects by destroying the weeds and rubbish left in the fields after the crops have been harvested. These weeds and rubbish are veritable winter resorts for insects. Why should a farmer furnish protection for destructive pests which he will have to fight the next growing season?

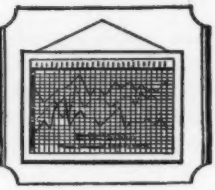
Painting, fence repairing, and a general pick-up done in the fall will save time in the rush of the spring work.

Why not stress the fall clean-up?

"In agriculture we should continue our effort to obtain higher productivity per worker, greater output per unit of cost. But we should not stop at that. We should aim to secure a wider joint effort by farmers to gain that bargaining power which industry and labor have attained by working together through their organizations built along lines of mutual interest."

—W. M. JARDINE, Secretary of Agriculture.

AGRICULTURAL DEVELOPMENTS



By P. M. Farmer

Winter vs. Spring Wheat

Wheat growers of central and southern Minnesota have been told by Andrew Boss, vice-director of the Agricultural Experiment Station, that they may expect much better returns by substituting winter wheat for at least a part of their spring wheat acreage. He says if a million acres of spring were changed to the right variety of winter wheat, farmers would get 5,000,000 more bushels of wheat. Although the price is usually lower he believes there would be a net gain of, perhaps, $3,500,000 or $4,000,000. Minturki is the winter variety favored most in Minnesota. Ten years ago only 70,000 acres of winter wheat were grown in the State. This year 201,000 acres were harvested. The Department of Agriculture says from 5 to 7½ bushels more per acre may be expected from winter than from spring wheat.

Moldy Silage

For many years the molding of silage has been generally attributed to poor packing when the silo was being filled. But it has been shown at the Wisconsin Agricultural Experiment Station that the air pockets have little to do with the molding. The condition of the corn at the time it is put in, say the investigators, is really the determining factor. Three empty crates were buried at different levels in a silo as the corn was being put in. Along toward spring when these crates were uncovered no mold was found around them and the silage was in good condition.

"If the corn is over-ripe, wilted, or frozen when it is put in the silo," says Prof. E. G. Hastings, "it carries so much air that it takes several days before all the oxygen is used in the ensiling process. In this period the mold may make a rapid growth, and although it does not spread after the oxygen is used, it remains unchanged and appears newly developed when the silage is used." His recommendation is that corn for the silo be cut immediately after it has dented and before it has dried out. The filling should be finished just as the corn is becoming dry.

New Use for Combine Harvester

The last few years have witnessed a great increase in the use of the combine harvester, a spread to new sections, but this has not been the result of any new use. Now comes a report from Oklahoma that a farmer of Ellis county has found it a money-saver in harvesting sweet clover for seed. County Agent Hyer says it cost this farmer $3.00 an acre to harvest with the combine against $12.00 if he had cut it with a binder and threshed it. He thinks more seed was saved than would have been secured by the old method.

Quackgrass Out in a Year

With a spring-tooth cultivator it is possible to rid land of quackgrass in one year, according to results obtained by Rex D. Kildoy, superintendent of the school farm on the Fort Totten Reservation in Benson county, North Dakota. He has been trying

out various methods. Last year he eradicated the pest completely from 32 acres. He reports that not a spear was left in spite of the fact the ground had been deeply plowed in the past and the roots were down nine inches. He is convinced quackgrass can be completely controlled if a small area is properly worked by a method that involves digging up the roots frequently and burning those collected.

New Sweet Clover Stays Green Longer

Because of the wide variability of sweet clover there is great opportunity for developing better strains. This possibility has been realized in one direction by the Department of Agriculture which has discovered a strain that remains green much later in the fall. It is one of several strains brought in by plant explorers from Europe and Eastern Asia. It is said to be a close approach to the ideal sweet clover which would be a kind that would stay green late, start early in the spring, and remain green all summer. There is now much interest in the production of better hay varieties, since most of the common sweet clovers, especially the white-flowered, are too coarse the second year.

Hen Should Have Doctor

In this, the most important poultry-producing country in the world, the hen deserves more attention from the veterinarians, said Dr. John R. Mohler, chief of the Bureau of Animal Industry at the recent meeting of the American Veterinary Medical Association. He called attention to the fact that up to the present, poultry raising has usually been considered an incidental enterprise, and as a result chickens have been left to shift for themselves, not being considered worth much trouble and expense. As an argument against this viewpoint he mentioned that last year hatcheries sold 800,000,000 baby chicks, that American hens lay an average of 760 eggs a second or 2,000,000,000 dozen a year, and that the annual value of poultry products is more than $1,000,000,000, being outranked in the livestock field only by dairy products and the products from the swine industry.

Dr. Mohler says the most effective control of poultry diseases must come through poultry raisers who will employ veterinarians skilled in this work. The State and Federal governments, he believes, should aim at the exclusion of foreign contagion, prevention of the spread of diseases from state to state, and eradication of disease when it appears. He thinks each state in which the poultry industry is important should establish a competent veterinary poultry service.

Earliness Explained

Earliness, at least so far as the tomato is concerned, seems to be a matter of rapid vegetative growth of the plant early in the season rather than quick ripening. The discovery, by the New Hampshire Experiment Station, was a by-product of some fertilizer experiments.

The experimenters found a great difference in growth between early and late varieties during the first part of July, when the early kinds showed 35 per cent more vegetation. The late varieties got much of their growth so late that many of them did not have time to ripen fruit. The experimenters conclude that early growth may be an inheritable factor and may be accelerated by proper fertilization, temperature, and methods of culture.

The per capita consumption of wheat in the United States since 1904 has dropped from 6.58 bushels to 4.9 bushels. During the same period the per capita consumption of sugar has increased from 70 to 113 pounds.

A view of northern Natal cotton country. Note the mountains and intervening flat lands which have to be cleared of scrub bush before cultivation. A local ginnery is situated under the mountain (center) and the estate headquarters are on top.

South African COTTON

By H. E. Andries

Umbogintwini, Natal, South Africa

¶ *How the other side of the world grows cotton*

Part Two

THE writer of this article recently had occasion to investigate the cultural methods adopted as standard by the biggest estate in the country (to which reference was made in the first article of this review) and a brief summary of their practices is given below.

The estate comprises some 65,000 acres of land of which 42,000 acres are arable, the remainder consisting of mountains, dense forest, and exces-

sively stony or otherwise unploughable land. The 23,000 acres of non-arable land is devoted to stock raising and provides ample grazing for the 7,000 cattle. The estate lies mainly in the extreme north of the Natal Province, but overlaps slightly into the Transvaal Province and into the Swaziland Protectorate. Most of the arable land in the Natal portion of the estate is scrub country which has to be cleared before ploughing is possible. The land over the borders is very open country with perhaps one tree to two or three acres.

The cultivated areas are divided into so-called "sections" varying in size from 600 to 2,400 acres. Each is controlled by a section manager and one or two assistants, with sufficient native labor for the working of the section. On a 1,500 acre section, for example, the native labor (Zulus for the most part) will vary from 60 during the ploughing period to 250 during the reaping season. The quota of "boys" required for each of the main cultural periods may be summed up as follows:

Ploughing and planting	1 native to 25 acres
Cultivating, thinning, etc.	1 native to 12 acres
Reaping	1 native to 4 acres
Clearing and burning stalks	1 native to 20 acres

The quota of labor required for the reaping periods depends entirely upon the expected yield per acre, and varies a good deal from year to year. On the section under discussion there is an appreciable variation in the number of hands from week to week, and almost from day to day during the picking period.

On such a section 260 working oxen, with a sufficient quantity of implements to keep them fully occupied, are required. Certain sections have tried and either adopted or discarded mechanical traction, but on the section dealt with here ox-traction only is used. Costs and acreage given in the following paragraphs are for animal-draught and must not be confused with steam or petrol tractor figures.

Stumping of virgin country is commenced as early in the year as possible. Starting in January or February (midsummer) stumping is continued on every opportunity until the middle of October (spring).

Ploughing is performed almost immediately over the newly stumped land and the soil thoroughly turned over with mouldboard ploughs. Cross ploughing with discs is performed in July and August; and in the second week in September the land is thoroughly disc-harrowed. This operation is followed by spike-tooth harrowing, and planting is commenced immediately. All planting should be completed by October 31, but may be delayed by droughty conditions which make working of the soil impossible.

Cotton may be planted as late as December, but this is very risky and not to be recommended, although in many cases the late crops were the only crops that survived the floods. Very late cotton, however, usually misses the rainy period and seed fails to germinate; or seed may germinate as a result of a thunderstorm and the young seedlings succumb to the subsequent intense dry heat and die off. On this estate almost 3,000 acres, which just missed the last rain at the commencement of the season, produced a poor stand or failed altogether.

On old lands the method of preparation is somewhat different. Only one ploughing is given and that immediately before planting. Disc-harrowing is dispensed with and only spike-harrows used. Ploughs are immediately followed by harrows and planters, and a big daily average is maintained. For turning over old land all available ploughs, disc and mouldboard, are used.

Fourteen teams of oxen, each of 16 animals, are used on the 1,500 acre section, and three-furrow ploughs are drawn. This gang can plough 25-30

(*Turn to Page* 47)

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"The Degree of Response of Different Crops to Various Phosphorus Carriers," Agr. Exp. Sta., Kingston, R. I., Bul. 209, July, 1927, Burt L. Hartwell and S. C. Damon.

Crops

As complete a treatise of sweet clover, a crop which has come into prominence in the last few years, as we have seen lately, is contained in Ohio's Bul. 405, "An Experimental Study of Sweet Clover." C. J. Willard, the author, not only gives the results of experimentation done at the Ohio State University during the years 1921 to 1925, but cites the results of agronomists of other stations who have worked with this legume. The bulletin is well worth the while of any one interested in the "weed" which has become a profitable farm crop.

Other bulletins are:

"Report of General Activities for 1926 with Financial Statement for the Fiscal Year ending June 30, 1926," Agr. Ext. Div., Univ. of Fla., Gainesville, Fla.

"Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol XII, No. 5, Sept.-Oct. 1927, Whole No. 128.

Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 237, Sept. 1927.

Economics

Shall I sell my wheat now or hold it for a higher price? How many times county agents in the wheat growing sections of the country have been asked this question! Considerable light is thrown upon the chances for making a right decision in Ext. Cir. 54, Kansas State Agricultural College, "Judging Price Risks in Marketing Wheat." R. M. Green and E. A. Stokdyk, the authors, have discussed the different factors upon which forecasts may be based.

Diseases

"Thread Blight," Agr. Exp. Sta., Gainesville, Fla., Bul. 186, Mch. 1927, G. F Weber.

Bul. 187, Florida Experiment Station, "Infection of Potato Tubers by Alternaria Solani in Relation to Storage Conditions," is a good description of early blight as it affects potato tubers. While L. O. Gratz and Reiner Bonde offer no definite control methods, their experimental work gives useful information on the causes and effects of this troublesome rot. Undoubtedly their work will lead to further research in an attempt to save growers the large losses now incurred from this source.

Queen Alfalfa Smiles

(*From Page 27*)

lime should be made. Two tons of ground limestone or 1½ tons hydrated lime will usually be sufficient. In all new seedings it is important to inoculate the soil with alfalfa bacteria.

Alfalfa is rich in protein and is equally as good as bran as a protein feed. Why buy bran when pound for pound the protein in bran costs from four to five times as much as in al-

falfa? It is only reasonable to suggest the slogan:

Don't buy your protein—Grow it —Grow Alfalfa.

In addition to being a cheap, high protein animal feed, alfalfa helps save fertilizer bills by taking the valuable element nitrogen from the air. About the only fertilizer required, once the crop is established, are frequent top-dressings of phosphoric acid and potash. Too frequently farmers in the Shenandoah have contented themselves with applying only phosphoric acid. In many cases this element may be all that is required, but if the stand is to remain good, the time surely comes when potash will become necessary.

Numerous observations on fields of alfalfa in the valley disclose that even now there are many fields of alfalfa that remain good two or three years, then begin to die off. Close examination shows indirect signs of potash starvation, a condition that could easily have been remedied by giving consideration to the potash needs of the crop. It is far easier to prevent poor yields due to plant food deficiencies than it is to restore a field of alfalfa to normal conditions. This aspect of alfalfa fertilization has been neglected and farmers would do well to modify their plans for care of this crop.

When a man is a success it is hard to hide the fact. This statement applies to J. L. Mean, a well known alfalfa grower and shipper whose farm is located near Mt. Jackson, Va. Mr. Mean has tested out high potash fertilizers on alfalfa with excellent results. He started his seeding in 1920 using two tons of ground limestone and 400 lbs. of acid phosphate. After the second year he decided the crop needed additional treatment and that year and each year since he has top-pressed with 300 lbs. of 0-13-6. The above treatment has yielded four cuttings each season on a hundred-acre field. The hay has been of excellent quality which has sold for an average price of $25 per ton.

One outstanding result of the top-dressing treatment, as practiced by J. L. Mean, is the extraordinary vigor of the alfalfa plants. The stand is even, plants sturdy, foliage of a deep green healthy color, and there is an entire absence of potash starvation symptoms.

What Mean has been able to do, surely others can do. Let the corn borer come if it must, but by all means farmers should have a substitute crop ready. Alfalfa offers the solution.

Farmers should take inventory of their fields and plan to seed new alfalfa and fertilize to restore old stands of alfalfa.

Where Insects Winter

(*From Page* 30)

near the orchard. The codlin-moth winters in a cocoon under loose bark or in the soil near the crown of the tree.

It would undoubtedly be a big task to go out and clean up and destroy all of the insect habitations on a farm, but a little more care from day to day, during the harvesting of the crops, and after, will reduce these places to a minimum. Also it will materially lessen the number of pests the following spring.

November and December present an ideal time in which to forestall the insect damage by a general clean-up campaign. Late fall plowing does much in preventing insect trouble. By this time many of the insects are inactive and cannot defend themselves or reconstruct a winter home that has been destroyed.

The drastic clean-up measures conducted in the territory of the European corn borer will bear fruit in killing millions of other insect pests. It will be found that many insects that were a problem to the farmer will no longer be a menace. Other districts could do well to start cleaning up in a similar manner.

South African Cotton

(*From Page* 44)

acres of new and 35-40 acres of old land per day. Work is commenced at daybreak (about 4.30 a.m.) and ceased at dusk (about 6.30 p.m.) with a breeak of 3 hours during the heat of middle-day, and half an hour for breakfast.

Harrowing as outlined above can be done at the rate of 10-12 acres per day with a disc harrow drawn by six oxen, and 15 acres per day with a spike-tooth drag-harrow drawn by a similar span. On sand land spike-tooth harrows only are used as disc harrows leave objectionable centre-furrows which develop into washouts. On heavy lands discs and spike are used.

Planting.. Seven to eight acres per day can be relied on from a two-row cotton planter, with rows 42 inches apart, at a cost of 7d per acre (14 cents). Where fertilizer is used it is applied through a fertilizer attachment to the planter. The acreage is reduced, however, to 4-5 acres per day, on account of the time taken in filling up the hoppers, and the cost of the operation is increased to 10d (20 cents) per acre. Seeding is at the rate of 30-35 pounds per acre, this being regarded as rather higher than is usual in South Africa. The cost of this seed is roughly 5/- ($1.20) per acre or 2d (4 cents) per pound.

Replanting is seldom found necessary if planting is completed within the period laid down above. Where patches are replanted the cost is 7d (14 cents) per acre, plus seed.

Fertilizer. The soil in this locality is rich in nitrogen, humus potash, and lime. On the other hand, phosphates are very deficient. This latter condition is strikingly evidenced by excessive vegetative growth and delayed maturity where phosphates are not supplied. A new railroad is under construction which will bring fertilizer and other goods right onto the estate.

Cultivation is given most thorough attention and commences when plants are four inches to five inches high, being repeated every nine days until the plants are too big to admit oxen and cultivators between the rows without damaging them. After rain, as soon as the land permits, cultivators are put into the fields irrespective of the date of last cultivation.

The so-called "Arch" and "Pony" types of cultivators are generally used, five acres per day being expected from each implement. As many as 24 gangs may be put into a field at one time. The cost of the operation is 6d (12 cents) per acre. From six to eight cultivations are given the crop at a total cost of 3/- to 4/- (72-96 cents) per acre.

Thinning Out is performed as soon as safe, viz: when plants are about six inches high. If left too late plants grow tall and spindly and lower branches do not develop sufficiently. The generally recommended practice of thinning out when plants are 12 inches or more high, as practiced in other areas of the union, is not approved of on this estate. Another objection to late thinning is the loosening of the soil by pulling out of roots, which renders the remaining plants insecure and easily blown over. The first thinning (for this is by no means the last thinning) leaves plants 8 to 10 inches apart in the rows. The richer the soil, and the bigger plants are known to grow, the greater the distance between plants after the first thinning out. Where soils are excessively rich in organic matter the first spacing may be as wide as 18 to 20 inches between plants in the row.

It might here be pointed out that in South Africa experiments so far performed have shown that thinly spaced plants grow quicker and produce more

and better lint than unthinned plants do. These conclusions have been confirmed on the estate we are examining, and on over half the acreage, where plants grow six feet high and proportionately broad, the spacing between plants is as much as 36 to 40 inches in the rows.

One native can thin out from 2/3 to 3/4 of an acre in a day at a cost of 2/- per acre.

Hand Hoeing to remove weeds in the rows and to complete the thinning out operation should be as soon after the first thinning as possible. One native can hoe 3/4 of an acre in a day at a cost of 2/6 per acre, and seldom more than two such weedings are necessary during a season. Usually during prolonged rains when machine cultivators cannot be used, hand weeding is resorted to.

On the appearance of bolls all field operations are suspended as such may result in damage to plants, though, owing to favorable soil and climatic conditions inducing large growth, further thinnings may be necessary on certain fields, even up to the time of the first ripening of bolls. Dense vegetative growth excludes sunlight from the bolls on the lower fruiting branches, and must be avoided even at the cost of decimating the stand. The improved yield more than balances the loss due to the operation.

American readers will here no doubt contrast this practice of drastic thinning out with the system of close-spacing adopted largely and recommended widely in the U.S.A. cotton states. We who are interested in cotton growing in South Africa have followed closely all the American work we could secure reports on, and have carried out similar experiments here, but with very different results. Whilst in many ways conditions in the Union of South Africa are similar to those in the U.S.A., yet many of the practices proved satisfactory in one country are by no means profitable in the other. Nevertheless, American conditions are more like our own than are those of any other established cotton-growing country, and approved American practice has been accepted as the starting point for most of our work on this crop.

Picking is not quite as definite an operation as are the various cultural processes that precede it. Reaping may be broadly divided, however, into three stages. Lint may appear as early in the year as February, but sufficient will not be visible to justify picking until much later. When about 30 per cent of the crop is ready for picking, the reapers are put into the field to collect the first flush.

The second picking commences when the second flush is at its height, and should occur about May. Third and last picking should be completed by the end of July. Still later pickings may be attempted, but the yield of the fourth collection rarely pays for itself.

The cost of reaping depends largely upon the yield obtained, and reapers are paid at the rate of 1/- (24 cents) for 50 pounds seed cotton picked. Expert native pickers have reaped as much as 200 pounds of seed cotton in a day and averaged 180 pounds daily over a week. This is of course exceptional, the usual average being about 70 pounds. Taking a yield of 450 pounds as a basis, the total cost of picking is 10/- per acre.

Whilst the rate of payment stated above (viz. 1/- for 50 pounds) is strictly adhered to on all sections of the estate under consideration, smaller growers have various difficulties to contend with that make higher rates of payment unavoidable. These difficulties include inefficient contract labor, competition with other small growers during the picking season, efficient independent laborers and gangs of laborers who offer themselves to the highest bidder and demand in addition to their pay, their food and blankets. Under these conditions picking is often found to cost 17/6 per acre

This photograph shows thinned and unthinned cotton. The row in the foreground is thinned to about 18 inches between plants. These plants, however show the effect of late thinning: viz., first 8 inches of stem devoid of fruiting branches. The plants were thinned at 15 inches height or about six weeks age instead of at 6 to 8 inches height and four weeks age. This is on South Africa's largest cotton estate.

for the same yield as that which on large and well run estates does not exceed 10/- to pick; and more than one case has come to the writer's notice of an acre cost amounting to more than 24/- for a yield of 400 pounds of seed cotton per acre or 3/- per 50 pounds picked.

All the above figures for picking include weighing and filling into 450-pound packs in which the crop is forwarded to the ginnery, but they do not include the cost of these packs nor the cost of cutting to the ginnery.

Cutting and Burning Stalks. Immediately after the last picking the cotton plants are cut down, collected into piles, and burned. This practice is, however, not definitely thought to be the best, but until some better way of dealing with the plants is evolved, it will be continued. The idea of burning is agreed to be wasteful of humus but as yet no practical, inexpensive means of conserving this valuable constituent of cotton stalks has been discovered. Several machines for cutting up the stalks into small pieces have been experimented with, but so far without success. Even American appliances for chopping cotton stalks have failed to give satisfactory results. The cost of cutting, collecting, and burning is about 4/- per acre.

Ratooning is now never practiced on these or other South African estates. It has been found to be a dangerous and highly unprofitable undertaking.

Immediate reploughing after cutting and burning is not always possible. If labor is plentiful, every endeavor is made to plough lands, on which picking is completed early, immediately after burning so that they may lie fallow for two or three months. On a large area this is frequently impracticable, and ploughing

has generally to be delayed until just before planting.

The Costs of the various operations per acre given above are based upon those of an average section, viz. 1,500 acres. They differ to some extent from section to section according to the ability of the section manager and the efficiency of his labor, and they vary from year to year according to the season.

Approximately 3,000 acres of virgin country are cleared and broken and planted each year, but the heavy initial cost of stumping and breaking is left behind in the first year, so that over a number of years the average cost of the purely agricultural operations listed is in the neighborhood of £2:15:0 ($13.20) per acre.

Yields are slightly lower on first year fields than is the case in later years. This is explained as due to the high humus content of the soil, which after thorough aeration by cultivations and reploughing commences to decompose and become available.

To the total given above must be added other costs such as of seed cotton packs, transport charges, ginning, delinting, selling, and certain overheads unavoidable on a big estate of this nature. The all-in cost of production per acre (on a basis of 450 pounds of seed cotton per acre) is officially stated by the company to be under £3:10:6 ($16.92) taken as an average over the whole area.

On these bases, and presuming the value of lint to be 19 cents (9½d) and the seed to be sold as good commercial seed at £4:10:0 per ton ($21.60), the balance sheet shows up as follows:

450 pounds seed cotton—		
150 pounds lint @ 9½	£5:18:9	
300 pounds seed @ £4:10:0	0:13:6	£6:12:3
1 acre ploughed, planted, and prepared for sale....		3:10:6
Net profit per acre		3: 1·9
Equivalent to U. S. Currency		$14.81

Indiana

(*From Page* 19)

For 18 years winter cattle feeding experiments have been under way at Purdue, until today the cattlemen and educators rather accept this work as standard in this field. The corn, clover hay, corn silage, and cottonseed meal ration has become more or less standard not only in Indiana feed lots but also throughout the corn belt. More recently, however, experimental work with steers, fed 10 to a lot, has shown the value of soybeans in the ration, taking the place of the cottonseed meal and giving the corn belt farmer another home-grown feed. Each year several hundred feeders from all sections of Indiana gather at the university to attend the annual cattle feeding day program and get the latest experimental results.

For many years hog cholera swept Indiana farms and made the business of producing pork a rather precarious one. Finally, through the results of research, led by Dr. R. A. Craig of the veterinary department, the making of serum and virus and the dosage per pig were standardized to such an extent that where vaccination is followed consistently cholera is practically unknown. This one piece of work has been worth millions of dollars to the farmers of the country at large.

Approximately 75,000 acres of tomatoes are grown in Indiana each year for canning purposes, giving the state first rank as a producer of this crop. The average yield has been between four and five tons per acre. Working in cooperation with the Indiana Canners' Association, the experimental staff has developed an improved

variety of the Baltimore tomato which will average about 10 tons to the acre under general farm conditions. Under most favorable circumstances and with the best care possible, it has yielded as high as 29 tons to the acre. The Indiana canners, realizing the importance of this work, have defrayed the expenses and through proper selection during 1927 distributed more than 10,000 pounds of seed to growers over the state. As a result, the yield per acre is going upward rapidly.

In the Same Field

Continuing in this same field, other research men are working with the canners' organizations to study factors affecting the quality of the tomatoes and tomato products handled in Indiana. This illustration, the growers being given help in production of their crop and then the canners in successful marketing, shows how a project in one field is carried to completion.

The same story might be told of the apple and peach growing industry which is thriving in southern Indiana.

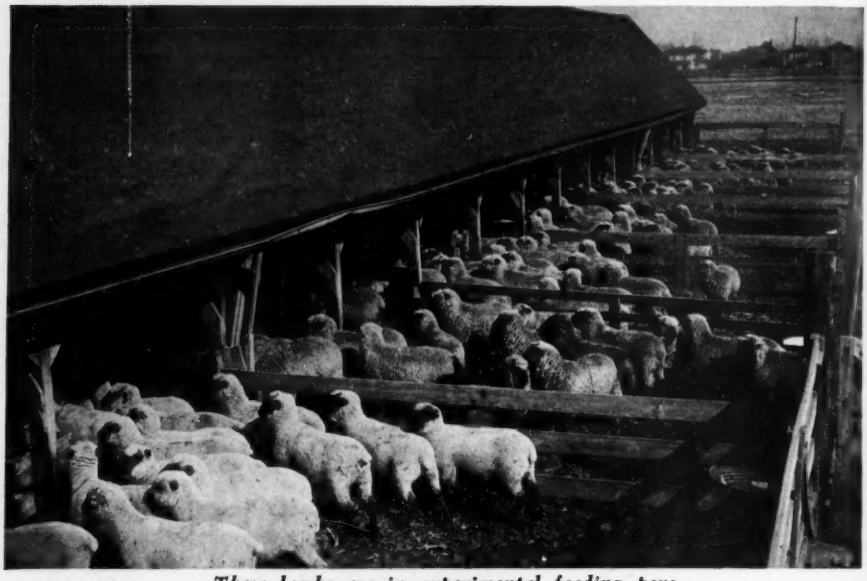
"We thought we knew how to handle our orchards and market our fruit until the Purdue men came down and showed us how not only to get better fruit but also how to pack it and ship it to best advantage," said R. A. Simpson, one of the most prominent growers. This comment related to extension work, but the extension men were carrying out the knowledge developed by the Experiment Station on the experimental orchards and farms near the commercial fruit center. When the Experiment Station received as a gift a worn-out, run-down farm of 457 acres near Bedford, and transformed it within a few years from a place yielding about $600 worth of fruit a year to crops worth as high as $12,000 annually, the fruit growers took notice.

Each year, when the summer field day is held at this farm, from 1,200 to 2,500 farmers and fruit men turn out for the farm tour and program. Besides the fruit experiments, hundreds of tests have been conducted on the farm with fertilizers, field crop varieties, and livestock feeding and management. Since the soil type found there prevails over a number of counties in that section of the state, the information obtained is applicable to perhaps 20,000 farms.

Southeastern Indiana has several counties which have a white slash clay land. Jennings county farmers were so interested in results obtained on one small experiment field that they requested the county to purchase a larger tract for more extended work. Over a period of years, the areas not given any soil treatment have averaged 18 bushels of corn to the acre. The areas properly fertilized, limed, and manured after being drained have averaged 77 bushels to the acre. The one-day picnic meeting on this field, known as the Jennings County Experimental field, attracted 7,000 persons in August, 1927.

In Kankakee

In the Kankakee region of northwestern Indiana, which at one time was the duck hunters' paradise because of the broad expanse of undrained marsh, a large area has been transformed into fertile farms, the equal of any in the state. Following draining of this area, the Experiment Station leased a 67-acre field to conduct experiments with crops. Corn, which is the principal crop in Indiana, would grow a few feet tall, turn yellow, and produce only small nubbins. Experimental work revealed that limestone and potash were the limiting factors in the growth of the corn. When these were applied, after suitable drainage, the fields produced, and the old Kankakee marsh section today boasts of many 100-bushel corn yields. Land values changed almost overnight when the experiments became common knowledge, and parts of a dozen northwest-



These lambs are in experimental feeding pens.

ern Indiana counties are using the data gained on this field.

A banker, the late William E. Pinney of Valparaiso, observed the results of the experiments on the field which was near his farm. So well pleased was he and so much did he appreciate the importance of the work to that part of the state that he gave to the Experiment Station a farm of 400 acres. On this farm is carried on more experimental work. It also serves as a demonstration center for that corner of the state.

Soft winter wheat has been grown in Indiana for years. Many millers blend with it hard wheats to make the flour the market demands. In meeting the problem of growing a hard wheat, one of the crosses developed in the plant breeding work of the Experiment Station has remained hard, and now farmers in many communities of the state are getting a premium for producing this hard wheat named Michikoff. It is a result of crossing Michigan Amber and Malakoff, a Russian variety. The wheat has retained its hardness and also hardiness, making it an excellent variety for the northern half of the state. Another cross from the same wheats has been named Purkoff, and this variety thus far has proven superior to any other being grown in the state.

The average rainfall in Indiana is about 37 inches, ample for most crops produced in the Middle West, and occasionally "too ample" for the hay crop at cutting time. Alfalfa growers sometimes have had difficulty in curing their crops. Prof. W. C. Aitkenhead of the agricultural engineering staff, in 1926, developed a stack drier which uses oil as a fuel. This drier will cure in a few hours a stack of hay which ordinarily would require several days of sunshine. The drier is being tested on Indiana farms. This same department is doing some interesting experimental work in using wind to turn an airplane propeller and generate electric current for farm lighting and power.

Rural Electrification

Rural electrification generally is another important project of the Experiment Station. In various parts of the state, rural service lines have been built the last few years and the farmers along the lines cooperate with the

University in studying the costs and practicability of various pieces of equipment. On the findings of these experiments will be based the extent of the farm electrification project.

One of the more recent discoveries of the Experiment Station and perhaps as far-reaching in importance as any is that of Dr. G. N. Hoffer of the botany staff who has devised a simple corn stalk test to determine the fertilizer needs of the field. Twenty-one experiment stations over the country are cooperating with Dr. Hoffer and the U. S. Department of Agriculture in extending this work. This discovery, while of a distinctly scientific nature, has a wonderful practical value because it can tell any farmer in a few minutes what his soils need in the way of plant food.

In the last few years the present director of the Station and extension work, Dr. G. I. Christie, has rendered a great service to research work through his activities in behalf of the Purnell measure, providing for funds for research in the previously almost unexplored field of marketing.

As chairman of the executive committee of the International Corn Borer Committee, Dr. Christie with Dean Curtiss of Iowa is in Europe as this story is written, arranging for cooperative research work with European institutions as part of the fight against the borer.

Seventeen States

The Purdue Experiment Station serves as headquarters for 17 different states which are carrying on cereal leaf rust investigations. Dr. E. B. Mains, leader of this project, maintains his headquarters at Lafayette, where many phases of this subject are being studied.

Scores of other incidents such as those mentioned might be given, for valuable contributions have come from each department of the Experiment Station. The feeds and fertilizer inspection laws and also the law of the creamery license division, all administered by the Experiment Station, are worth more than passing note because they have served as models for similar acts in many states.

In 1926 the Department of Agricultural Statistics, formerly the crop reporting service of the Department of Agriculture, was moved to the Experiment Station. This change has been of distinct value to the service and also to the Experiment Station, because of the closer contacts maintained in all crop and livestock forecasts and reports.

This little resume of some of the more important things done and being done by the Indiana Experiment Station gives a birds-eye view of the institution.

"The big thing that impresses me about your staff is that they are up and coming and proud of what they have done and are doing for the agriculture of the state," commented one prominent educator recently after a visit to the Experiment Station and the university.

The staff members believe in their jobs and what they are doing as something distinctly worth while in the life of the state and nation. With such a feeling, the good results are bound to continue.

Storing Apples

(*From Page* 21)

cylinder engine.

This cave has been in use for the past three seasons and has given very satisfactory results as a common storage. It has the three principal qualifications of a common storage house, namely, the ability to secure and hold a low temperature, adequate ventilation, and sufficient humidity to prevent the wilting of the fruit.

The summer temperature of this cave when closed remains constantly below 45 degrees regardless of outside temperature. In the early fall months when it is difficult to obtain

a temperature of below 60 degrees in a common ventilated storage house, this is an important item. Even when several thousand bushels of warm fruit are brought in from the orchard the temperature is raised only a few degrees.

By actual comparison the temperature in this storage in late September, 1925, was equal to one common storage using ice to reduce the temperature, 8 degrees lower than another storage also using ice, and 15 degrees lower than a common storage without ice, all these storage houses being in the same vicinity. As the weather becomes colder, the temperature can be controlled by the amount of air permitted to enter the cave, and in severe weather freezing is prevented by closing the doorway constructed across the natural mouth of the cave.

Due to the lay of the land, the natural path of the cold air from the surrounding territory is toward the mouth of the cave, and as the warm air is being forced out, cool air continually finds its way into the cave and about the packages of stored fruit.

The natural seepage of water into the cave provides good humidity, especially before freezing takes place outside, and at all times the humid conditions are very satisfactory and the fruit is protected from shrivelling.

Last summer trial lots of Yellow Transparent and Duchess apples were placed in the cave to determine the possibility of prolonging the marketing season of summer apples. The Transparents were stored the latter part of July and the Duchess the first week in August. The Transparent apples remained in good condition for a month, and the Duchess were still in good condition on September 15 when the Jonathan storage began.

A ventilated storage container has been found to be much more satisfactory than a tight container such as a headed barrel.

This is especially true in the case of Grimes, Rome, and Stayman as these varieties scald badly when stored in a tight package.

Beer cases from an extinct brewery are being used this season as a storage container along with the bushel basket and an unlidded bushel box. The beer cases have a lid that hooks shut and are of two sizes, holding one and one and one-half bushels respectively. The hand holes furnish a small amount of ventilation.

Cause and Control of Corn Root Rot

(*From Page* 8)

The potash applications gave practically no increases in yields just as was predicted by the stalk tests.

Another similar case occurred in Fayette county. Stalk tests in this county indicated that potash is not a limiting factor and the fertilizer test made by Walter Scholl proved this to be true. Where he applied potash the corn produced just one pound more corn than where he did not use fertilizer. Potash did no good just as the stalk tests would indicate.

These various fertilizer tests prove the value of potash and phosphate in the control of root rot of corn. They do more than that, they also show that the indications of the stalk tests are valuable guides to the fertilizers needed by the corn in the control of root rot.

Another Factor

There is another factor in fertilizer recommendations on corn that must be considered. Let us suppose that a soil is lacking in phosphate and the plants are stunted. These small plants show no signs of nitrogen starvation nor of potash deficiency.

The indications would be that phosphate alone would remedy the trouble. But, when phosphate is applied and the corn makes an increased growth, there are more tissues developed all of which are demanding more potash and nitrogen. It is quite possible under these conditions that the corn plants will not develop properly, and the natural reaction would be: "This test is of no value. I applied the fertilizer needed and the corn does not yield much better." The answer to this is that when the phosphate was supplied, and the plants grew larger, the limited quantities of nitrates or potash in the soil were not sufficient to supply the increased growth of corn.

This is exactly what happened to Rauth Brothers in Warrick county, Indiana. Their corn was stunted and the stalk test showed iron accumulations. Following the recommendations they applied 2-12-2 fertilizer, and as a result the plants produced normal size stalks, but the corn was still chaffy and the yield was only about 35 bushels per acre. The next year they applied manure plus 160 pounds of 0-10-10 in one case and the same amount of 2-12-6 in another. With these fertilizer applications the yield jumped to about 70 bushels per acre of well matured corn.

What had happened? When 12 units of phosphate were applied the increased growth of corn increased the demand for potash and the 2 units supplied were not sufficient. However, under the same conditions, 6 units or 10 units of potash did supply the required amount, and as a result the corn stalks developed normally and the ears were filled and matured.

In other words when making fertilizer recommendations be guided by the soil reaction, the size and nature of the corn plants, as well as by the indications in the plants of the fertilizer deficiencies.

Growing Rice in Arkansas

(*From Page* 24)

it will be more and some years less. If $1.50 per bushel is received by the growers, counting in all grades, this is considered a reasonably satisfactory price.

Many Arkansas rice farms are operated by renters, the land without water being rented at $5 per acre. Where a pumping plant is already installed and kept in working order, the renter pays $10 per acre, but does his own pumping.

A well must supply seven gallons of water per minute for each acre of rice, with the flow continuing 24 hours each day and from the time it is first applied to the field until harvest time. When the weather is very dry or the rainfall is light, 9 to 12 gallons should be flowing from the well each minute for each acre of rice.

It takes approximately 32 inches of water to make a rice crop. This must come from rain or from irrigation water during the growing period. This is in addition to the water that may be in the soil and used by the plants.

Most of the water applied for irrigation is given over a 90-day period, that is, during June, July, and August. Usually 16 to 20 inches of water are applied as irrigation, the balance coming from rain.

On a hot day from one-tenth to one-fourth inch of water is evaporated from the water surface in the rice field. This, of course, is completely lost and is not counted in the amount of water used by the rice. The pumps run night and day for the 90-day period to keep the water supply as nearly constant as possible.

Pork Stands the Test

(*From Page* 15)

has been to show that the proteins of meat not only have as high nutritive value when fed in a mixed diet as when fed alone but that they increase the power of the cereal protein. Here is where the ham sandwich gets its credit. The ham increases the value of the proteins in the bread.

After his many experiments and the study of results of the work of others, Mr. Hoagland has concluded that from a scientific standpoint pork is deserving of the high place it has taken in the American diet. He stresses its importance as a source of fat and energy. He says it contains a fair amount of protein of excellent quality with liberal quantities of vitamin B.

Ordinarily, he says, pork is highly valuable for persons doing heavy work, and the leaner parts such as ham, tenderloin and chops, are just as good for sedentary workers as other meats.

The Comeback of the Cut-over

(*From Page* 12)

natural fertility.

Thus with the aid of a bit of pioneering a country with naturally poor soils has made its lands fertile and by doing so has developed a working basis for a healthy, profitable system of farming. A South Mississippi farmer, who, with the aid of the correct fertilizer and the right methods of culture and boll-weevil control, can produce a bale of cotton to the acre, is little worried over the fact that the timber is gone from his farm and there are no more jobs to be had at the saw-mills.

The working knowledge of fertilizer gained through analysis tests with the principal field crops has aided in the work with other crops. Besides testing the varieties of cotton, corn, vegetables, fruits, and forage crops, in search of the hardiest, best-yielding strains and their plant food requirements, the Station encouraged the practice of commercial truck growing and introduced various horticultural crops.

The first organized work on satsuma oranges in South Mississippi was done when the Station proved that they could be grown successfully when grafted on trifoliata stocks. This practice has caused a general movement northward of the satsuma industry because these stocks are sturdy and survive severe temperature.

A stranger, visiting the section today, is likely to be shown hundreds of acres of peaches, pecans, and satsumas next door to typical southern cotton farms. He may have pointed out to him a peach tree that produced at three years' growth four bushels of peaches which sold for $2.50 per bushel, or a satsuma that produced 2,000 oranges which sold for $40, or any number of other outstanding accomplishments.

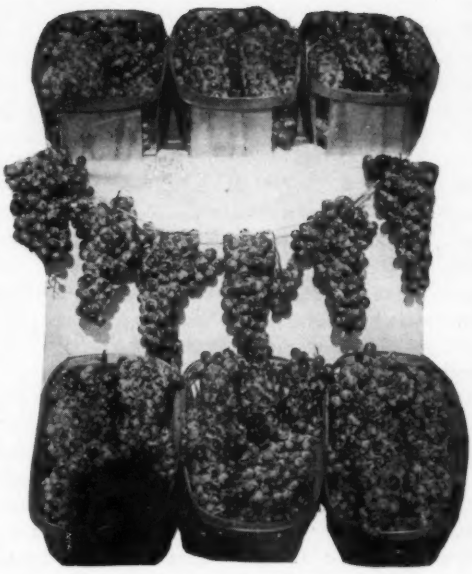
Wide Diversity of Crops

The diversity of crop possibilities in the section is amazing. It appears that grapes have great commercial possibilities and experiments are being conducted to determine this. Strawberries have been continually recommended and their production as a commercial crop is expanding.

A few of the many crops the Station is testing as possibilities for the section are: bright tobacco, alfalfa, blueberries, plums, apples, apricots, almonds, Japanese persimmons, pineapple pears, figs, grapefruit, briar ber-

ries, raspberries, dewberries, and cherries.

Believing that South Mississippi offered an attractive field for the trucker, having soil and climate almost ideal and railroad facilities to the best markets, the Station started experimenting in truck crops in its early days. As a result several communities are now specializing in the production of such crops as snap beans, squash, carrots, and tomatoes.



Grapes grown on the Station farm.

The commercial production of sweet potatoes has been introduced with great success. Winter cabbage is one of the most profitable crops that has been tried, and asparagus proved thoroughly adaptable to the section.

The coastal plain soil is excellent for syrup production, and a bulletin on sugar cane had to be run to several editions. Velvet bean experiments have been under way since the establishment of the Station. Practically every farmer who grows corn in South Mississippi grows velvet beans as a companion crop depending on them to winter cattle as well as furnish considerable nitrogen for succeeding crops.

Lespedeza has attracted interest as a hay and grazing crop and a soil builder. The first field of lespedeza grown in the section was a curiosity and very few farmers knew what the plant was. Today thousands of acres are in this legume.

Thus the coastal plain section of Mississippi is being developed as a profitable farming country. Whether or not it is "The New California" I will not attempt to say. However, the sun shines on it with much the same warmth and brightness with which it bathes the western state, and standing on a breeze-swept hill looking down at the soldierly array of a satsuma grove or a great peach orchard, and back across the miles of undeveloped land, one feels the rich promise of a new frontier. With this comes also a deep appreciation of the agricultural pioneers who are working so diligently to give it birth.

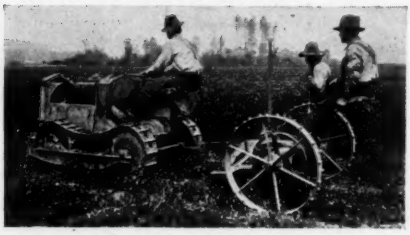
Mint

(*From Page 26*)

land soils if you irrigate it, but muck lands produce higher yields. Sub-irrigation is desirable in midsummer. It costs from $50 to $70 an acre to get a planting started and this planting will last three or four years on muck land before it has to be renewed."

What is probably the most extensive as well as interesting mint planting in Oregon is that of E. A. and J. O. Hayes at Lake Labish near Silverton. Manning Hayes, a graduate of the University of California, is operating this large holding for his father and uncle. About 700 acres

of mint will be harvested on this plantation in 1927. They have contracted for 20,000 pounds of oil a year for the next three years at $5.00 a pound. However, they expect to produce considerably more than that because the first crop in 1926 averaged 75 pounds of 56 per cent menthol per acre and the second crop from the part that was cut produced 25 pounds of 47 per cent. The United States government standard calls for 50 per cent U.S.P., and so the second crop produced had to be sold as second class.



Cutting Mint Hay.

Not many years ago Lake Labish was nothing but a swamp overgrown with brush, weeds, timber, and slashings. For countless decades it had been the home of beavers for geologists say that the lake itself was made by these industrious animals. That is why the soil is called "Beaver Dam" soil.

The Hayes brothers saw the possibility of developing the project, and so they cleared the timber, drained the land, and brought it into a cultivated state. Until they started their mint production, onions, potatoes and other truck crops were grown. They made a specialty of growing onion sets. Some years as many as 85 per cent of the onion sets grown on the west coast were produced on this farm.

Liberal amounts of muriate of potash were used in producing these onions because they found the peaty soil to be low in this plant food. Potash fertilizers will also be used on the mint crop although they were not applied in 1926, because of the residual supply left from the onions.

Manning Hayes says they will continue to grow a few onions, but it will be on a smaller scale if the mint proves to be as profitable in the future as it is now. Last year he estimated that it cost about $2.00 to produce a pound of oil on this high priced land even with the large scale production and its accompanying advantages from the labor-saving standpoint.

Thorough Preparation

Before planting, the soil was thoroughly prepared and marked off into rows 30 inches apart. The roots were put into the ground in March by laying them lengthwise in these furrows and partly covering them with a quick turn of the foot. They were buried to a depth of about six inches with a two-way cultivator. A spike tooth harrow was made by fastening together three two-by-fours and driving 60-penny spikes through each of them at a distance of three inches apart. The mint was then harrowed four or five times with this implement until the plants were several inches high, after which they were cultivated once a week as long as the teams and cultivators could get through.

Hand weeding began the first of June and continued until cutting started the first of August. Smartweed, dog fennel, and dock must be kept out as these weeds discolor the oil and give it an undesirable foreign flavor.

Some growers cut their mint by hand, but Hayes thinks the cost of hand cutting is prohibitive. Their mint is cut with mowers equipped with short sickle bars. They are pulled with tractors that keep moving right along. If the crop is heavy, Hayes rebuilds the divider, making it longer and higher, and sends two men with wooden rakes to rake the mint out of the way of the next round of the mower. If the crop is light or medium, a clover buncher cut down to the length of the sickle bar, will

work, and this requires only one man to follow to cast it out of the way. This is done because the oil cells break very easily, and every time a horse steps on the hay or a wheel passes over it, some oil is lost.

The mint hay is then cured and handled in much the same way as clover hay except that it is hauled to stills instead of to haymows. The still consists of a furnace and boiler for producing steam, mint tubs or vats, perfectly fitting covers, condensing worm, and receiving separator can.

Some growers have grapple power forks to unload the hay from the wagon to the vats, while others do this by hand. The vats run in pairs so that one can be filled while the other is being steamed out. One man tramps the hay after each forkful is put in. The vat is filled level with the top, after which the cover is placed on the water seal. The steam is turned into the bottom of the tub, and the cooling water turned on the condensing worm.

One Crop a Year

The distilling time varies from thirty minutes to three hours or more, depending on the condition of the hay and the moisture in the atmosphere. A smelling cock in the cover is opened from time to time to determine when all the oil has been extracted. The oil is run into gallon bottles in which it can be held for a long time without deterioration if it is stored properly. When oil prices are very high, these bottles are sometimes put in bank vaults for safe keeping.

There seems to be a tendency to cut only one crop a year in order to improve the quality and lessen danger of winter-killing. If mint is cut too green, both the yield and quality are poor. The menthol content is low in green oil and the odor is not so good. The plants should be in two-thirds to three-fourths bloom. The one or two early blooms should be disregarded, and the blooms on the branches taken into consideration. Much of the desirable odor and flavor come from the flowers so one can afford to allow a few of the leaves near the ground to drop off if necessary in order to get the desired amount of blossoms.

Apparently no thorough fertilizer trials have been made on mint in the western states. Agricultural Agent E. W. Cooney of Douglas county, Oregon, started a series of trials on upland plantings this year.

L. O. Herrold, a large grower at Salem, Oregon, says:

"The nature of the ground determines the kind and amount of fertilizer one should use. There is nothing better than barnyard manure applied in the fall and disked in, even though one may increase his weed troubles by using it. Lime is good on land that is long wet in the spring. On our muck lands, we use commercial 4-2-16 fertilizer at the rate of 125 pounds to 200 pounds per acre. Even though our muck lands are well supplied with organic material, they require a little readily available nitrogen to start the plants. On our river bottom and upland soils, we apply 200 to 250 pounds per acre of 4-4-16. If the land is run down, a 6-4-16 mixture is used. The fertilizer is applied evenly over the ground as early as possible after plowing in the spring."

Dr. J. E. Maxwell has an extensive acreage of mint on muck soils near Decatur, Michigan. He applies 300 pounds of 2-8-25 fertilizer to the acre and has found this to be a profitable practice.

A Profitable Undertaking

The profitable use of a fertilizer with a high potash content bears out the results of experimental work which shows the outstanding need of peat and muck soils to be potash. These soils are well supplied with nitrogen, and when first reclaimed ordinarily have enough phosphoric acid for satisfactory crop growth. After a few years' cropping, however, it may be necessary to supply both

phosphoric acid and potash.

Walter Van Fleet of the United States Department of Agriculture made an extensive study of the mint situation in Michigan and Indiana a few years ago, and his fertilizer recommendations are being accepted by western growers. He discusses their use as follows:

"Notwithstanding the high nitrogen content of the swamp soils on which mints are generally grown and the favorable texture of these soils for root penetration, there is often evidence of lack of quickly available plant food during rapid growth. Nitrate of soda, 50 to 150 pounds to the acre, well distributed and cultivated in before the tops have made too much growth, has been found profitable by progressive growers. Potash in the form of muriate or sulfate, from 150 to 300 pounds to the acre, has been widely used, with generally favorable results, to stimulate growth and darken the foliage. It appears particularly useful for a form of chlorosis apparently favored by too much water in the soil. Ground bone, acid phosphate, and lime have been tried in varying quantities by a few planters, but without marked benefit. The return of the steamed mint hay to the soil and the plowing under of the aftermath are most widely recognized as beneficial. Stable manure as a direct application is little favored, as it is often followed by watery growth and low oil content, while the resultant weeds are likely to become an intolerable nuisance. The indirect results of stable manure, when applied to preceding well-cultivated crops are, however, of inestimable value."

The future of the mint industry is hard to predict. The prices for mint have varied from 75 cents to $25.00 a pound in the last 40 years, but the average price over this period has been about $2.75 a pound. Conservative advisers, therefore, are suggesting that farmers use caution in planting much land to this crop unless they can produce oil at a lower cost than that. The large acreages that have been planted these past two years cannot help but bring the price down from its present high level even though there has been an increasing mint oil demand for candy, gum, medicinal and other uses.

Mint still manufacturing companies are advocating further plantings, but they have an axe to grind.

Mr. Herrold says:

"The outlook for the mint growers is a hard question. It is my opinion that where the ground is suitable and the growers are properly advised so that production costs are kept down, mint growing in the northwest will be a profitable undertaking. Only the financially strong should depend on mint alone. It should be grown in rotation with other crops because this offers other chances for income if mint prices get below cost of production."

Why Credit Stays High

(*From Page* 14)

dear to the American farmer while cheap to the shaky European state or the South American concession hunter. This banker, by the way, is not one of your gougers. He doesn't pile up charges by means of commissions and minimum balance requirements; nor does he collect interest in advance. But conditions oblige him to function on a purely local basis.

That is why his customers are continually inviting him to explain why his interest rates are high when money is going begging in New York at 4 per cent.

"It is like this," he said. "My bank is small, and that means that I have a high overhead cost per unit of business. Deposits are my chief source of loanable funds. In order to get de-

posits I have to compete with other bankers in our locality, and that means I must pay high interest rates. Naturally, after having borrowed money at a high rate, it is impossible for me to loan it at a low rate. But that is not all. My loans are concentrated in a limited area, and the risk on them is greater than it would be were the loans better distributed and diversified. High-cost money and high-risk loans are not favorable to low interest rates.

"Why don't I join the Federal reserve system, or get cheap money at the intermediate credit banks? I will tell you frankly. Membership in the Federal reserve system would impose too many restrictions on me, in view of the character and small size of my business. As for rediscounting at the intermediate credit bank, you know the deterrent there. The intermediate credit bank does not allow much of a spread between the interest rate it charges and the rate the banker may charge his customer. It is limited, except in the case of livestock loans, to 1½ per cent. That, candidly, is not a sufficient inducement for the small banker to rediscount, although it may be for the big banker."

Imagine that situation existing in hundreds of agricultural communities, and you can see how local shortages of loanable funds can develop even when the country as a whole is oversupplied with capital. Most country bankers, of course, have city correspondent banks from whom they can obtain funds when need arises; but they don't care much about borrowing from their city correspondent because the rate is usually higher than the Federal Reserve discount rate and so the country banker makes nothing, or very little, out of the transaction. Credit is often high for the farmer largely because he is not put in touch with the national sources of credit supply.

Now it is obvious that in communities where most people want to borrow and few want to lend, the local supply of credit cannot be adequate. That is so plain indeed that much legislation has been passed to correct it, the most recent enactment being the Intermediate Credits Act of 1923 which is expressly intended to open pools of investment credit to agricultural uses. As yet, however, the intermediate credit banks have had in most areas only a limited call on their resources. So the farmer still gets off at a sign saying "No relief from high interest rates."

This article is not intended in any way to reflect on banks or bankers. Widespread economic evils are always traceable to general economic causes, rather than to individual responsibility. In the case of high agricultural interest rates, one obvious general cause is the fact that, as yet, our banking system is too much decentralized, notwithstanding the far-flung operations of the Federal reserve system and the Federal farm loan system and the intermediate credit banks. It is for the expert to point to the remedy. But whatever its precise form, it will certainly have to provide means for enabling the farmer to tap sources of credit where money is abundant and cheap. The present system, to a large extent, restricts him for short-time loans to the resources that country bankers can accumulate locally from deposits.

Neighbors

(*From Page* 4)

Of course I get the same degree of satisfaction that a man does who lays aside five hundred bones for his funeral expenses. When he has passed from disease into decease he has the assurance that the most polite and circumspect undertaker in town will supervise the obsequies.

The worst of it is that this love-your-neighbor-second-hand business is creeping out into the country districts —that last staunch stronghold of the busybodies, the sick-watchers, the basket-bringers and the party-line eavesdroppers.

When it reaches the zenith of its bureaucratic dominance in "the sticks," we may see them skimming off the cream of human kindness in a centralizer run by a corporate dynamo. I think they may then have some just reason to kick about the test! If we could contrive to confine this bursting social fever to the cities the farmer would be saved—once more, halleluiah!

IT is a curious fact that the gregarious instinct of mankind settled America, on the one hand, while the hermit and the individualist did most of the prospecting and discovering.

The Pilgrims and the Puritans, the French Huguenots, the German refugees, and the Scotch-Irish covenanters possessed America by the call of neighbor to neighbor overseas, and by the common need for close habitations in the wilderness.

Then as the western urge to go over the Blue Ridge and beyond to the Ohio and the prairies came, we see an advance guard of hermits and lonely scouts making their camp fires glow in unknown lands.

It is related of Daniel Boone that he thought it wise to move onward as soon as he could hear the sound of his neighbor's ax or the crack of his neighbor's rifle.

Perhaps he feared that the borrowing fever might come and he would lose some powder or venison, or else somebody would lay a matrimonial snare for his restless moccasins.

Anyhow, Boone and his kindred were not noted as chummy, yet they made the way easier for the man who wanted to move in with an ox team, a feather bed, one wife, a breaking plow, and eighteen children.

On the contrary, some of those old scouts were over-neighborly and not any too discriminating or finicky in their choice of companions as we size it up these days.

For instance, I worked for several weeks on a Sioux reservation beside a benevolent old codger of poetic taste and gracious mien. He took a strange liking for me as a raw tenderfoot, and asked me over to his home to dine.

I went over all dolled up for a social evening, and was offered dog soup and burned potatoes a la carte served by his Oglalla squaw who chewed spear-head (not mint) and wore a deerskin chemise.

Since that night I have fully appreciated what it cost to civilize America. The odor of cabbages and fried onions in my apartment hall no longer spoils my day's routine.

Yes, we owe the noble red brother a debt of gratitude. He *scared* people into being neighborly in more ways than one.

AS one of my trades is poesy, I observe after a period of brain bruising that the only words to rhyme with neighbor are *sabre* and *labor*. This is significant. It means that you can either *fight* with him or *work* with him. Personally, and in a local sense, I have done both alternately

and have succeeded in getting better acquainted both ways without formal intervention by a third party.

If I can do this, so can nations! But they will find it easier and cheaper to *work* with their foreign neighbors than to use the broad sword.

This summer a train load of people representing eighteen nations toured Canada on a trip lasting four weeks. English, Spanish, German, Italian, and Yankee families were occupying the same sleeping cars, eating meals together, and dancing and attending services in the dining car.

I observed that the common denominator among them was the showing of kodak pictures of their children, their homes and gardens, and their places of employment. They were brought together in the first place by a desire to study and improve a branch of agriculture.

"We're a jolly lot and have had a ripping time," declared the editor of a paper published on Arundel street in the Strand, grasping the hand of Herr Schneider of Bingen as we all parted at Niagara Falls.

"If all the bloomin' diplomats in Europe could tyke a tour like we have and forget the red tape," said he, "we wouldn't need any more armies over theah!"

So, with an Egyptian on one end of the line and an Irish squire dancing on the other end, the gang joined hands around the table and sang "Auld Lang Syne."

Hence I do not find it so strange that I came home from that excursion feeling as neighborly and chummy with John Brown of Appleby, Scunthorpe, Lincolnshire, as I do with Frank Smith of Columbia Heights, who empties ashes on the same pile with me from October to May.

If the belligerent nations that crouch like measly tom-cats all through the long night of mistrust would stay awake and come into the sunshine of human contact, I say for one, that this old world would get a real League of Nations. It would be built on neighborly understanding and stay put.

Paradoxical, perhaps, is the fact that there are many more neighbors than there used to be, and yet we hear so many folks say, "We haven't any neighbors."

Strange and perplexing likewise is the aloofness common to cultured communities and the genuine shirt-sleeve camaraderie found on the rickety front steps of tenement houses.

Book lovers and students cling to their winter cloisters and pull the evening shades to secure their concentration. Wrapped in their favorite authors and critics, they forget that the delightful Comedie Humaine they devour on the printed page was *lived* by *contact* on the writer's part. He knew his neighbors.

Repartee and original observations worthy of the name come hard to most of us in this period of selfish isolation. We lack the nimble fireside fluency of our fathers, whose chief inspiration to thought came direct and freshly vivid from *mingling with contemporaries.*

Contrast Abe Lincoln, Henry Clay, and John Calhoun with some of our machine-made minds who get their impressions from the press rather than from the people.

We must not forget that we have something to *give* as well as to gain by cultivating the acquaintance of good neighbors. We'll all admit that, surely.

If you think you haven't good neighbors worth bothering about, don't blame the real estate man who sold you the property. Pitch in and reform 'em; and if that fails, move!

But beware! Wherever *you* go you are going to be *somebody's* neighbor. Be careful—he might like you!

And when we reach the "last analysis" we shall find corner lots and neighbors in the cemetery.

Of course, if you are a real hidebound bitter-ender on this question you can be cremated or arrange a burial at sea!

"AMEN!"

Says H. J. PLUMB

County Agent, Stevens County, Washington

FOR PEAT'S SAKE USE POTASH, said G. E. Langdon of the Wisconsin College of Agriculture in the November, 1926, issue of BETTER CROPS. "Amen," say we, basing our rejoinder on several years' experience with the peat soils of the Colville valley, Stevens county, Washington.

The accompanying illustration shows clearly the results obtained last year on the Peter Selleg farm in this county. A commercial fertilizer analyzing 32 per cent phosphoric acid and 21 per cent potash was used at the rate of 150 pounds per acre. It is remarkable that this comparatively light application shows the results that it does, which to our minds amply proves the advantage of using it, especially on the peat soils of the Colville valley.

The fertilizer not only effected the yields—making a difference of from a third to a half in the grain yield of oats—but noticeably stiffened the straw, thus preventing lodging and greatly facilitating effective harvesting.

Peter Selleg's oat crop.

There was almost an equal effect on the legume and hay crop following which in this case is clover, timothy, or alfalfa—depending on whether the peat is well enough drained to permit the growing of the latter.

Good results are still observed in the third year removed from the applications of fertilizer.

Limestone Losses

Why is it that 75 per cent of Illinois land that fifteen to twenty years ago would grow good crops of clover without any special treatment now requires a dressing of limestone? The reason, says an agronomist of the University of Illinois, is that crops make great draughts on the limestone supply and drainage water carrys much of it off. This investigator says four years of average crops of the kind commonly grown in the State take away the equivalent of 208 pounds of limestone. It was shown that a 50-bushel crop of corn in one season takes out 27½ pounds of limestone from an acre: a 50-bushel crop of oats takes 21 pounds: 25 bushels of wheat takes 14 pounds: and 2 tons of clover hay 146 pounds. On the famous Morrow plots at the University the effects of years of cropping have been shown in a striking manner. One plot has been supporting a rotation of corn, oats and clover for 50 years, all the crops being taken off and no limestone or fertilizer added. Last year red clover was seeded on this plot and, in spite of favorable conditions of weather, there was only a very poor stand of unthrifty plants. The adjoining plot on which limestone losses had been made up by applications had a good crop of clover this year.

ADVERTISING

A Jewish moneylender had been elected a member of an exclusive country golf club. The master caddy had asked him if he desired to have his name imprinted on his golf balls.

"And you vould put my name on a dozen balls at that price?"

"Yes," was the response.

"And vould you put on them my address, too?"

"Yes."

"For de same price?"

"Yes."

"Vell, den, for the same price would you mind putting on them too—Office hours, 9 to 5?"—*Exchange.*

Mr. Billerton, the butcher, was a jovial soul. As he was cutting up an order of lamb chops for a lady customer she asked curiously: "Mr. Billerton, what led you to choose your present occupation?"

"Well, really, I don't know, ma'am," explained Mr. Billerton. "Maybe it was because I have always been fond of animals."—*Exchange.*

"I don't suppose you keep anything so civilized as dog biscuits in this one-horse, rundown, jay town, do you?" the tourist snarled.

"Oh, yes, stranger," the village merchant responded pleasantly. "Quite a few folks like you come through from the city, and we aim to have everything called for. Have 'em in a bag or eat 'em here?"

No man's a model husband when he's hungry.

AN UNWILLING PUPIL

"What is all that racket about out there in your barn?" asked a neighbor.

"Ma's trying to set a hen," replied a small boy who was swinging on the gate, "and you know pa's county agent and he's tryin' to tell her how."—J. M. R.—*Exchange.*

Magistrate—"Why did you conclude that the defendant was drunk?"

Constable—"He was engaged in a heated argument with a bus driver."

Magistrate—"But that does not prove anything."

Constable—"Well, sir, there was no bus driver there."

"A toast, fellers!" exclaimed the hobo, lifting his tomato can. "Here's to de holidays! Bless de hull t'ree hundred an' sixty-five of 'em!"—*Exchange.*

"Do you and your wife ever think the same?"

"When I'm late at the club we do. She keeps thinking what she'll say when I get home and so do I."—*Exchange.*

"Did that patent medicine you bought cure your aunt?"

"Mercy, no! On reading the circular that was wrapped around the bottle she got two more diseases."

Brown (gazing for first time at city's heavy traffic)—"Jee-rusalem, Hiram, they sure are back with their hauling, ain't they?"—*Wall Street Journal.*

Nine Years After

EXPERIMENTS, conducted on nearly every soil type, show that most of the excess potash in heavy applications is not lost through leaching but remains available in the soil until it is utilized by crops. The beneficial effects of excessive applications of potash are often noticeable in crop yields several years after the potash was placed in the soil. Loose sandy soils are the only soils that lose potash to any extent through leaching and they will hold the element much longer than they will hold nitrogen.

The value of excessive applications of potash is definitely shown in the results of an interesting experiment conducted several years ago at the Pee Dee Experiment Station at Florence, South Carolina. Alfalfa was planted on Orangeburg sandy loam and highly fertilized. One plot received an additional amount of 1,000 pounds of muriate of potash per acre. Large yields of alfalfa were obtained, the best yield coming from the plot with the heavy potash application.

Nine years later the alfalfa was plowed under and the field was planted to cotton and fertilized at the rate of 800 pounds of 8-4-4 per acre. Although the large alfalfa yields had made a heavy drain on the potash in the soil (each ton of alfalfa hay removes the equivalent of 70 pounds of muriate), the plot receiving the heavy potash application nine years before showed a marked superiority over the remainder of the field in cotton yields.

The potash remaining in the soil through nine years caused the plot to yield more than a bale to the acre while the cotton on the remainder of the field rusted badly and gave poor yields. It must be remembered that the entire field received 800 pounds of 8-4-4 per acre and the only additional fertilizer that the heavy yielding plot received was the 1,000 pounds of muriate nine years before the cotton was planted.

To get the best results from nitrogen and phosphoric acid the farmer should always apply sufficient potash to meet the full needs of the crop grown. If excessive quantities of potash are applied it is not lost under ordinary conditions but remains fixed in the soil in an available form for other crops which follow. It is better to apply too much potash than not enough.

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